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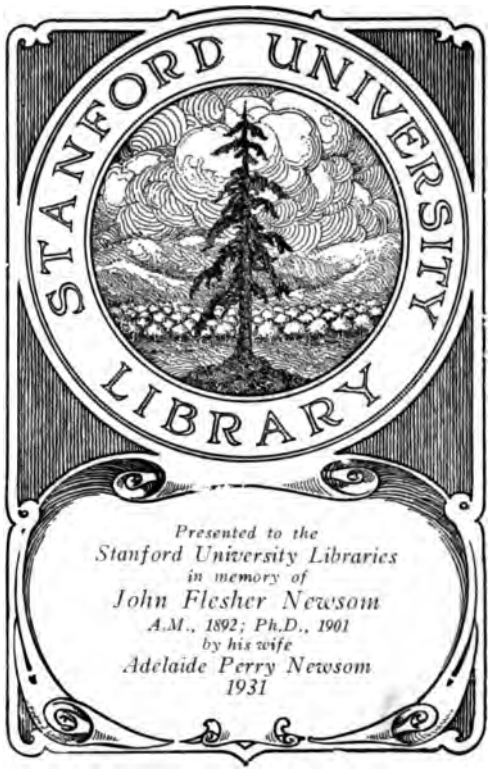
ILLUSTRATIONS

OWEN'S GEOLOGICAL SURVEY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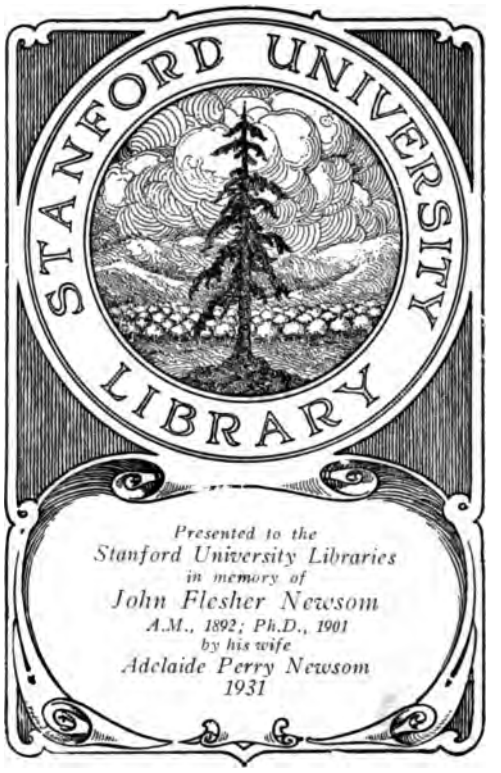
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Hon Joseph R Chandler
From D Dale Owen

ILLUSTRATIONS

TO THE

GEOLOGICAL REPORT

OF

WISCONSIN, IOWA, AND MINNESOTA.

BY

DAVID DALE OWEN,

UNITED STATES GEOLOGIST.

PHILADELPHIA:

LIPPINCOTT, GRAMBO & CO.

1852.

520711

PHILADELPHIA:

C. SHERMAN, PRINTER,

19 St. James Street

TABLE I.

TRILOBITES OF THE LOWEST SANDSTONES OF WISCONSIN AND MINNESOTA.

Medal-ruled on Steel, from the Original Specimens.

THIS mode of engraving, from the actual specimens, by which a perfect fac simile is obtained, has been applied, I believe, for the first time, in the execution of eight of the plates of organic remains accompanying this work. The result, for a first experiment, has been eminently successful; at least applied to subjects not having too great relief or convexity, as will be observed by inspection of this and the other seven plates engraved by this process.

Until the discovery of the Trilobites represented in this and the succeeding plate, collected during this Survey, no Crustacean remains had been found in any rocks older than the Trenton, Black River, and Chazy Limestones of the State of New York.

Tab. I., Fig. 1. *Dikelocephalus Minnesotensis.* (N. S.) From the fifth Trilobite-bed of F. 1, on the banks of the St. Croix, at Stillwater, Minnesota. Restored outline, in dim contour.

" Fig. 2. *Dikelocephalus Minnesotensis.* Pygidium of a smaller individual, showing the short caudal appendages.

" Fig. 3. *Dikelocephalus Miniscaensis.* (N. S.) From the third Trilobite-bed of F. 1.

" " *a.* Part of cephalic shield.

" " *b.* Pygidium.

" Fig. 4. *Dikelocephalus? Iowensis.* (N. S.) From the first or lowest Trilobite-bed, 400 to 450 feet beneath the base of the Lower Magnesian Limestone.

" Fig. 5. *Dikelocephalus granulosus?* Pygidium, from the third, or Miniskah Trilobite-bed.

" Fig. 6. *Lonchocephalus Chippewaensis.* (N. S.) Part of cephalothorax and caudal shield, from the fourth, or Marine Mill Trilobite-grit, about 170 feet below the top of F. 1.

" Fig. 7. *Dikelocephalus granulosus.* (N. S.) Part of cephalothorax, from the third, or Miniskah Trilobite-bed.

" Fig. 8. *Crepicephalus?* Pygidium, from the Miniskah Trilobite-grit.

" Fig. 9. *Dikelocephalus Pepinensis.* (N. S.) From the buff magnesian layers in F. 1, near the base of La Grange Mountain, at the head of Lake Pepin.

" " *a.* Part of cephalothorax.

" " *b.* Pygidium.

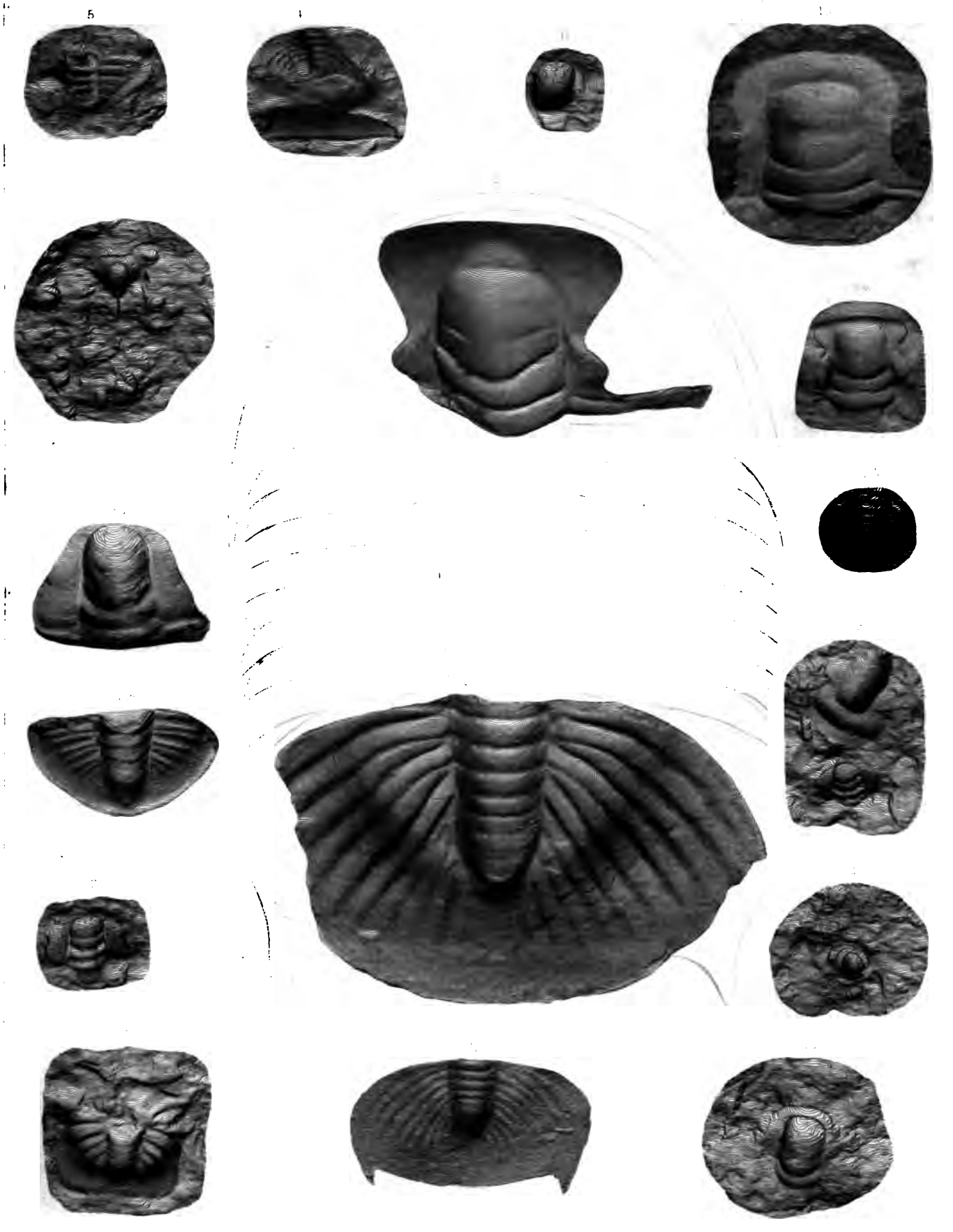
" Fig. 10. *Dikelocephalus (Minnesotensis?)* From the buff magnesian layers with the last.

" Fig. 11. *Menocephalus Minnesotensis.* Glabella; from the third Trilobite-bed, Miniskah.

" Fig. 12. *Dikelocephalus Miniscaensis?* From the Miniskah Trilobite-bed.

" Fig. 13. *Crepicephalus? Wisconsensis.* (N. S.) Part of cephalothorax, and a portion of the cephalic shield of *D. granulosus?*

" Fig. 14. *Lonchocephalus Chippewaensis?* (N. S.) From the fourth Trilobite-bed, on the Menomonie River.



Medal-relief from

TABLE I.

A.

TRILOBITES AND FUCOIDAL IMPRESSIONS, FROM THE LOWEST PROTOZOIC SANDSTONES, F. 1.
OF WISCONSIN AND MINNESOTA.

Medal-ruled on Steel from the Original Specimens.

Tab. I. A. Fig. 1. Slab of gritstone, from the Miniskah, or third Trilobite-bed of F. 1, containing, along with other less perfect impressions, part of the cephalic shield of ***Dikelocephalus Minnesotensis.***

The exquisite effect and truth of the medal-ruling process are beautifully exhibited in the manner in which it has brought out not only the fossils but the grain of the rock, in this specimen.

" Fig. 2. Fucoidal impressions in the layers under the Marine Mill Trilobite-grit, St. Croix River, Minnesota.

Singularly enough, part of the impression bears a fantastic resemblance to a reclining human figure in bas-relief.

" Fig. 3. Cheek-plate and cephalic spine of ***Dikelocephalus Minnesotensis*** **(*?*)**, found in the buff magnesio-calcareous layers near the base of La Grange Mountain, at the head of Lake Pepin, Upper Mississippi.

" Fig. 4. Part of the cheek-plate and cephalic spine of ***Dikelocephalus Miniscaensis***, near the confluence of the Miniskah and Mississippi Rivers.

" Fig. 5. Glabella of ***Dikelocephalus Miniscaensis***, near the mouth of the Miniskah River.

" Fig. 6. Glabella of ***Dikelocephalus Minnesotensis***, near the head of Lake Pepin.

" Fig. 7. Cephalic spine and part of cheek-plate of Dikelocephalus Pepinensis (?), near the head of Lake Pepin.

" Fig. 8. Curious fishhook-shaped spine, which was attached to the posterior part of the glabella of ***Lonchocephalus hamulus***, projecting backwards in the median line of the body. From the third Trilobite-bed, near the mouth of Miniskah River.

" Fig. 9. Embedded portion of cephalic shield of ***Lonchocephalus Chippewaensis***, showing the spicula or small spine projecting backwards from the glabella in the median line.

" Fig. 10. Glabella of ***Crepicephalus*** **(N. G.)**, near Miniskah.

" Fig. 11. Pygidium and caudal spine of an undetermined Trilobite; near Mountain Island.

" Fig. 12. Glabella, with spine attached, of ***Lonchocephalus hamulus*** **(N. S.)**; from the Miniskah Trilobite-bed.

" Fig. 13. Pygidium of ***Dikelocephalus*** **(*?*)** ***Iowensis***, Mississippi, near Mountain Island.

" Fig. 14. Pygidium of ***Crepicephalus*** **(*?*)** ***Miniscaensis*** **(N. S.)**, from the Miniskah grits.

" Fig. 15. Pygidium of ***Lonchocephalus*** **(?)**, with long, slender, divergent caudal spines. Near Mountain Island.

" Fig. 16. Pygidium and portions of ***Crepicephalus*** **(?)**, and portions of cephalothorax of that genus; from the Miniskah Trilobite-grit.

" Fig. 17. Glabella of ***Dikelocephalus Pepinensis*** **(*?*)**; from the buff beds near the head of Lake Pepin.

" Fig. 18. Glabella of ***Crepicephalus?*** near Miniskah, Mississippi River.

Model made from original specimens

J M Butler

TABLE I.

B.

SPECIMENS CONTAINING LINGULA, OBOLUS, AND ORBICULA, FROM NEAR THE BASE OF THE LOWEST PROTOZOIC SANDSTONES OF WISCONSIN AND MINNESOTA.

Medal-ruled on Steel from the Original Specimens.

Tab. I. B, Fig. 1. Slab, containing several species of Lingulas and Orbiculas, from the Falls of St. Croix. This engraving illustrates beautifully not only the capabilities of the medal-ruling process for such subjects, but the highly fossiliferous character of these beds, near the base of a formation at one time supposed to be nearly barren or entirely destitute of organic remains.

" Figs. 2, 7, 10. Slabs, containing *Lingula antiqua* and *Lingula prima* (?), in F. 1. *b*, from the Falls of St. Croix. No essential difference has been discovered between some of the Lingulas in these slabs and those of *Lingula antiqua* and *prima* of the Potsdam Sandstone of the State of New York, except in size; the St. Croix specimens being usually much larger.

" Figs. 4, 6, 8. *Lingula pinnaformis* (N. S.) In F. 1. *b*. Falls of St. Croix.

" Figs. 3, 14. Slabs of Obolus grits, from the banks of the Mississippi, nearly opposite the old mouth of Black River.

" Figs. 5, 12. *Lingula ampla* (N. S.) From the Lingula grits, member *c*, of F. 1, Upper Mississippi River, near Mountain Island.

" Figs. 9, 11, 15, 20. *Obolus* (*Appolinus?*). From member *b*, of the grits below Mountain Island, nearly opposite the old mouth of Black River.

" Figs. 13, 16, 17, 18 (?), 19, and middle figure in 8. *Orbicula prima* (N. S.) From the lowest layers at the Falls of St. Croix.

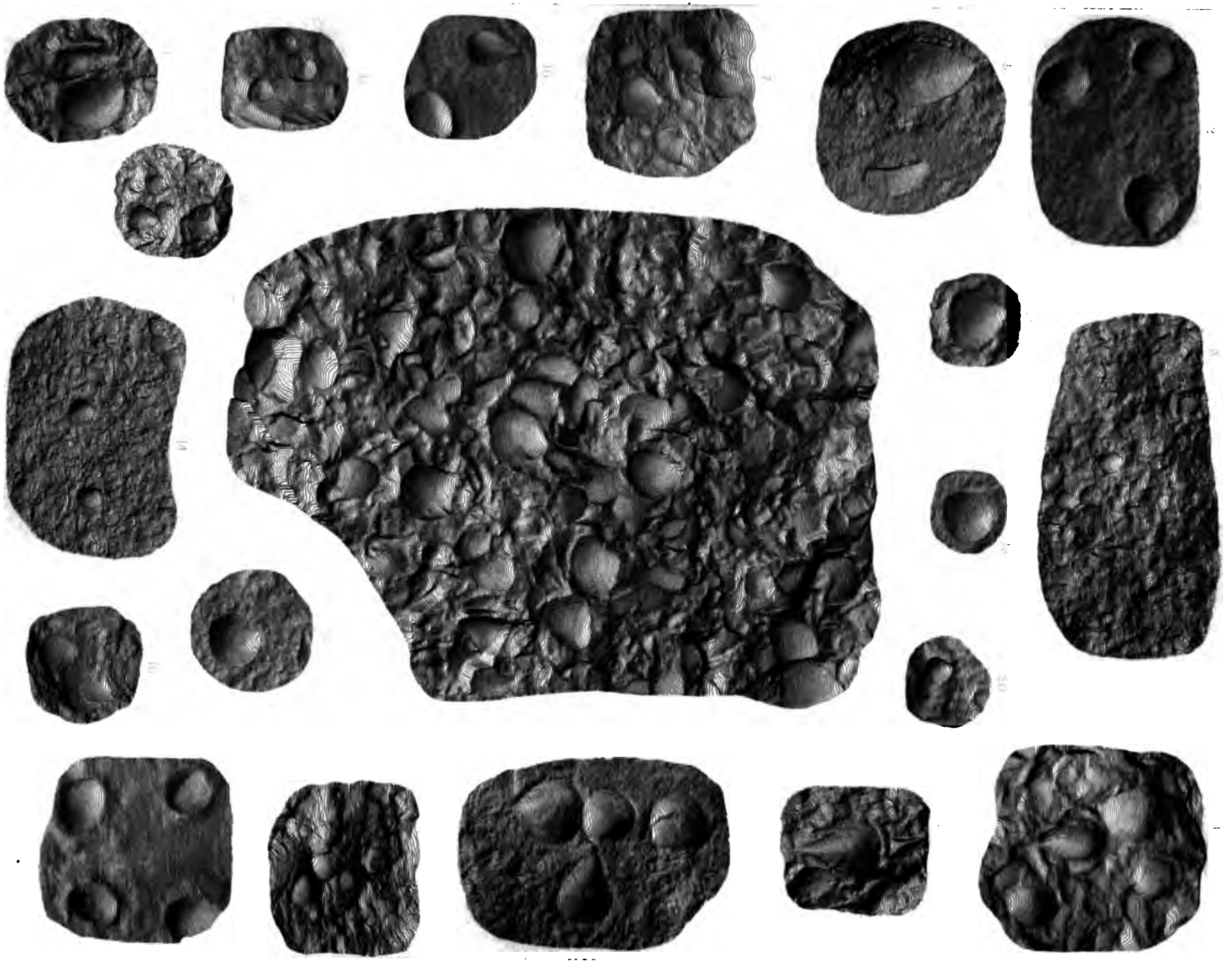


TABLE I.

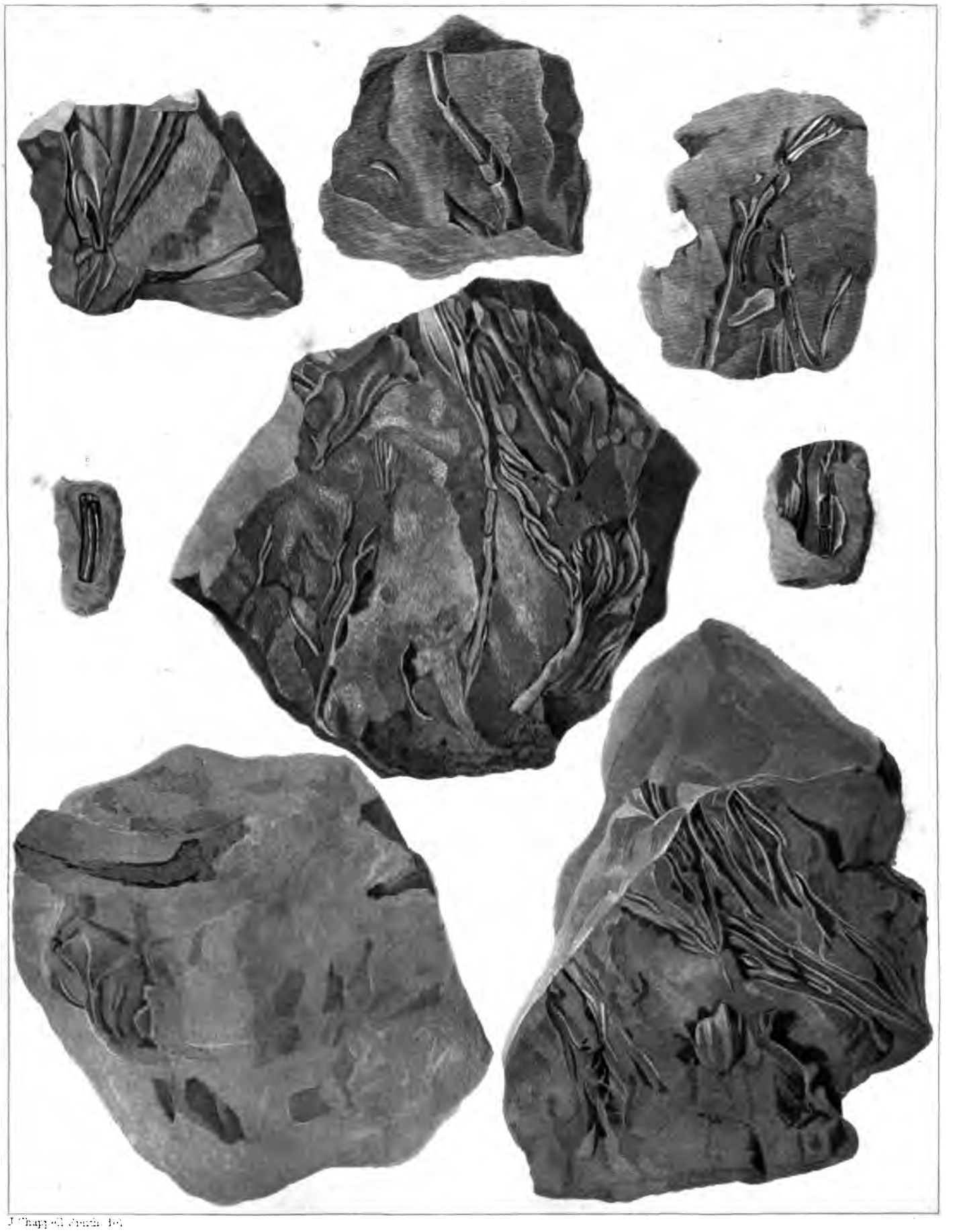
C.

FOSSIL PLANTS.(?) FROM THE RED SANDSTONES ON THE NORTHWEST SHORE OF LAKE SUPERIOR.

From drawings by J. Chappellsmith.

Tab. I. c, Figs. 1, 2, 3, 4, 5, 6, 7, 8. Fossil plants (?), in the Red Sandstones on the northwest shore of Lake Superior.

It is most probable that these fossils are the remains of certain sea-weeds or fucoids; but their state of preservation hardly admits of their being classified. The rarity of everything organic in the Lake Superior rocks invests every specimen in the least calculated to throw light on their palæontology with peculiar interest; hence their introduction here.



J. Chapman del. et lith.

J.M. Butler.

TABLE I.

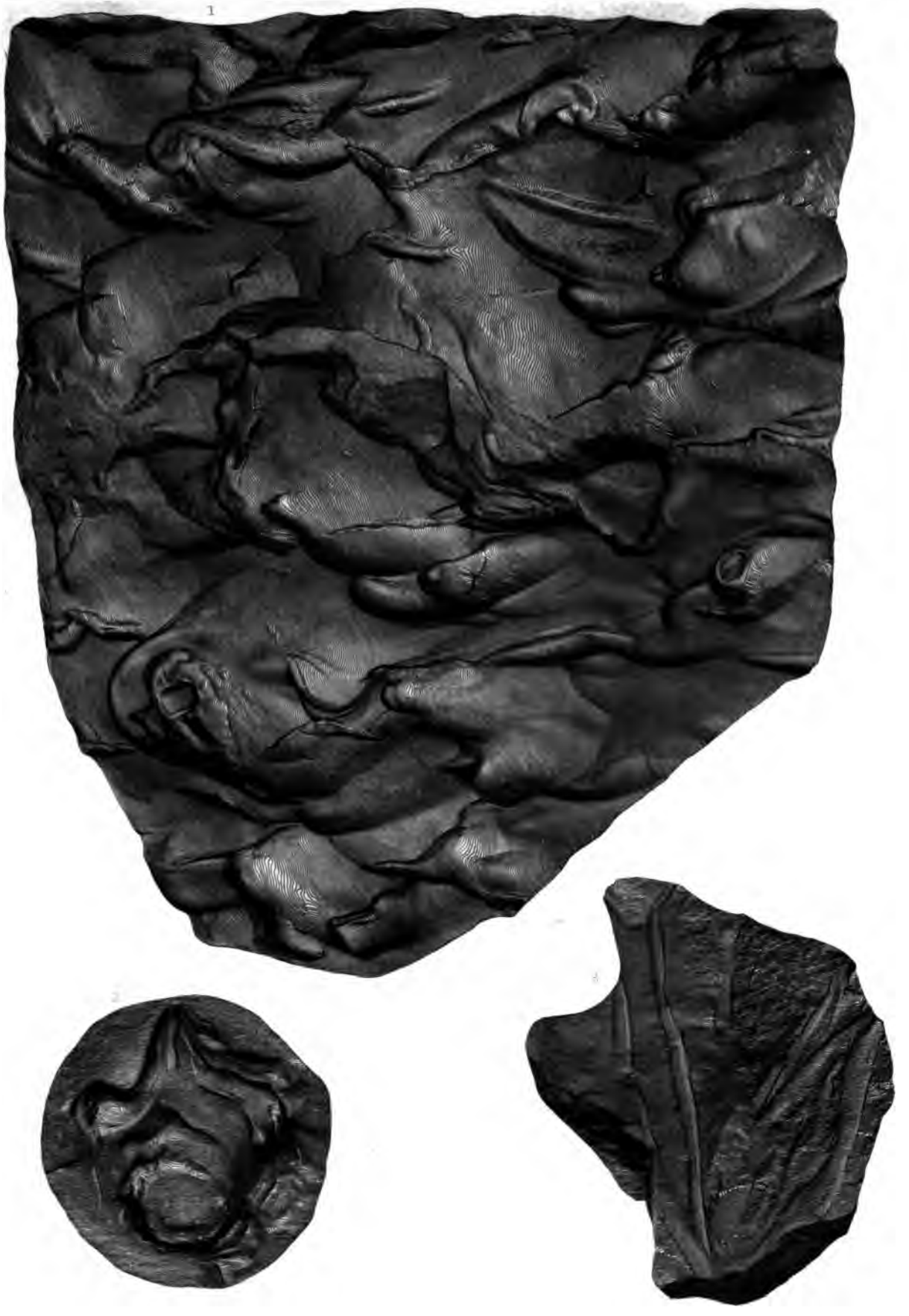
D.

MUD FURROWS (?). AND IMPRESSIONS OF PLANTS (?), IN THE RED SANDSTONES OF THE NORTHWEST SHORE OF LAKE SUPERIOR.

Medal-ruled on Steel, from the Original Specimens.

Tab. I. D, Fig. 1. This is a perfect fac simile of markings or furrows, in bold and high relief, of a quarter to half an inch, on a slab of argillaceous gritstone. Whether it has been produced by tidal action, on a muddy, sandy sea-shore, I am hardly prepared to say. It has not at all the usual form of ripple-marked sandstones, such as are common on the south shore of Lake Superior. From the peculiar pendent and lengthened mammillary appearance of some of the furrows, and the resemblance of the rock to volcanic grits, I am rather disposed to the belief that the material of which the rock is composed was once volcanic mud, and that, while in a viscid state, it congealed suddenly, or became fixed in the very act of flowing down the hillside; transmitting to us a lapidified memento of the action of some mud volcano in the vicinity.

" Fig. 2. The origin of this curious fossil has been a great puzzle. Most persons, regarding it at first, might be tempted to consider it an ornithichnite; and, indeed, a very close similitude can be observed to a bird-track, in the general contour of the impression. A resemblance can also be traced, in certain parts of the fossil, to the beak and muscular impression of an *Ostrea*. Nevertheless, after having carefully studied this specimen in connexion with others of a similar character from the same locality, in all its *variable* forms, we are led to the conclusion that it had no such origin; but has probably been derived from some marine vegetation, of a curious and very anomalous form.



Metal relief [illegible] from original specimens

[illegible] White-Brown & P Newsam at J M Butler's Estab

TABLE II.

TRILOBITES, FROM F. III., A; GASTEROPODA AND BRACHIOPODA, FROM F. II. AND F. III., A; TOGETHER WITH FUCOIDAL IMPRESSIONS, (?) FROM THE RED SANDSTONES OF LAKE SUPERIOR.

Tab. II., Figs. 1, 2. *Fucoidal impressions* (?), from the Red Sandstones of Lake Superior. For conclusions regarding Fig. 1, the reader is referred to the remarks on Tab. I. c.

" Fig. 3. *Isaphus* (*Isotelus*) *Iowensis* (N. S.), from Turkey River, Iowa, in F. 3. Restored view.

" Fig. 4. Glabella of the same.

" Fig. 5. Compound edge of the same.

" Fig. 6. *Pleurotomaria muralis*. Lower Fort Garry, Red River of the North, in Magnesian Limestone, F. 3.

" Fig. 7. *Pleurotomaria* (*umbilicata?*). Prairie du Chien, in the shell-beds, F. 3, A. Though the spire of this *Pleurotomaria* is considerably elevated, and the third carination or ridge very obscure, yet it is probable that it may still be referred to the species *umbilicata*, which occurs both in the Bird'seye and Trenton Limestone of New York, and is very variable in its form.

In many respects it approaches *Pleurotomaria delphinuloides* of Goldfuss, but the spire is shorter, the convolutions fewer and wider apart and more expanded. This fossil occurs in the buff-coloured shell-beds (F. 3, A) at Prairie du Chien. In the corresponding beds at the Falls of St. Anthony, a cast of a smaller analogous gasteropod is common, which appears to be in every respect like the New York *P. umbilicata*.

" Fig. 8. *Murchisonia bellicincta*. Cast. Elkader Mills, Turkey River, Iowa, in F. 3.

" Fig. 9. *Macrocheilus* (N. S.?) Cast. This fossil bears a strong resemblance to *M. subcostatus*, D'Orb.; *Buccinum Schlotheimii*, Vern.; but as that fossil seems to be a Devonian species, it is probable that this must be different, as it occurs in the Magnesian Limestones of Turkey River, Iowa, in F. 3, associated with fig. 8.

" Figs. 10, 11. *Holopea* (species undetermined). Cast. Elkader Mills, Turkey River, Iowa. This fossil is allied to *H. obliqua*, Pl. xxxvii., fig. 2, Hall's Palæontology, and may be the same species.

" Figs. 12, 13. *Straparollus* (*Euomphalus*) *Minnesotensis*, (N. S.) Cast. In the Lower Magnesian Limestone of Traverse des Sioux, St. Peter's River.

" Fig. 14. *Pleurotomaria* (sp. undetermined). Cast. Elkader Mills. This fossil bears some resemblance to *P. umbilicata*, except that the spire is much more depressed, and consequently the form much more discoidal.

" Figs. 15, 16. *Bucania*, three miles above Fort Snelling, probably a new species, as it differs from the *bidorsata*, *expansa*, and *punctifrons*; the three species found in the corresponding strata of the New York System.

" Figs. 17, 18. *Leptæna trilobata* (N. S.), in the shell-beds, F. 3 A, near the Agency, on Turkey River, Iowa. This fossil shell bears some resemblance to *L. deltoidea* of the Trenton Limestone of New York, but is much more distinctly trilobate, with fully as much or greater convexity of shell than the *L. camerata*, as shown by fig. 18.

" Fig. 19. *Posidonomya* (*Ambonychia*) *bellistriata* (?) of Hall. Cast. In the shell-beds of F. 3, A, at Prairie du Chien in Wisconsin.

" Fig. 20. A pustulated cephalic shield of a Trilobite, allied to *Illænus arcturus*, in F. 3. Lower Fort Garry, Red River of the North.

J Brown del.

J.M.Butler

TABLE II.

A.

TRILOBITES AND A BRACHIOPOD FROM THE PROTOZOIC ROCKS OF THE NORTHWEST.

Metal-ruled on Steel, from the Original Specimens.

Tab. II. A, Figs. 1, 2, 3. *Asaphus* (*Isotelus*) *Iowensis* (N. S.), from a bituminous bed of limestone near the junction of F. 3, A, and F. 3, B, mouth of Otter Creek, Turkey River, Iowa.

" Fig. 4. Pygidium of the same, showing obscure segments.

" Fig. 5. Glabella of the same, inadvertently represented inverted by the engraver.

" Figs. 6, 7. Compound eye of the same, with a portion of the cephalic shield.

" Fig. 8. Pygidium of a new species of Phacops? from the same bed.

" Fig. 9. Part of the thoracic segments of Dikelocephalus Minnesotensis, from the Stillwater Trilobite-bed on Lake St. Croix.

" Fig. 10. Pustulated cephalic shield of an Illænus, from Lower Fort Garry, Red River of the North.

" Fig. 11. *Lyttonia sericea?* from the Magnesian Limestone of Red River of the North.

" Fig. 12. *Calymene senaria.* This fossil occurs in the shell-beds, F. 3, A, of Wisconsin and Iowa, but the particular specimen here figured was obtained in Ohio, and was selected for representation, as well to exhibit a more perfect individual of this species than any procured in the Northwest, as to test the applicability of the medal-ruling process to subjects of such relief and character.

TABLE II.

B.

FOSSILS OF THE SHELL-BEDS (F. III., A) AND OVERLYING LEAD-BEARING BEDS (F. III., B) OF THE UPPER MAGNESIAN LIMESTONE OF WISCONSIN, IOWA, AND MINNESOTA.

Medal-ruled on Steel, from the Original Specimens.

Tab. II. B., Fig. 1. *Cyrtoldes ornatus* (?), three miles above Fort Snelling.

" Fig. 2. Pygidium of *Phacops* (N. S.?) Turkey River, Iowa, associated with Fig. 1, Tab. II. A.

" Fig. 3. *Leptæna* (N. S.?), near the base of the Upper Magnesian Limestone of Wisconsin, above Savannah?

" Figs. 4, 5. *Orthis subjugata* (?), three miles above Savannah, in the shell-beds at the base of the Upper Magnesian Limestone of Wisconsin.

This fossil may possibly be a new species, as it differs from *O. subjugata* in the umbo being more elevated, and in the size and prominence of the ribs, as well as in their mode of bifurcation.

" Figs. 6, 7, 14, 15. *Orthis testudinaria.* The specimens here figured are from Ohio; they were selected for representation as being more perfect than those hitherto collected in the Northwest, to test the applicability of the medal-ruling process to fossil shells of this character.

" Fig. 8. *Lingula quadrata* (?), from the lead-bearing beds of the Upper Magnesian Limestone, near Dubuque, Iowa.

" Fig. 9. *Orthis*, undetermined, in the shell-beds, F. 3, A, above Savannah, Wisconsin.

" Fig. 10. *Leptæna deltoidea*, Falls of St. Anthony, Minnesota, in the shell-beds F. 3, A.

" Fig. 11. *Orthis pectinella*, in the shell-bed F. 3, A, at Prairie du Chien.

" Fig. 12. *Leptæna sericea* (?), and *Orthis* (undetermined), from Great Lake Winnipeg.

" Fig. 13. *Selenoides Iowensis*, (N. S.) Turkey River, Iowa, associated with Figs. 8 and 9, Tab. II.

" Fig. 16. *Leptæna* (N. S.?), in the shell-bed, F. 3, A, at the Big Springs, near the Upper Iowa River.

" Fig. 17. *Lingula* (undet.) Lower Fort Garry, Red River of the North.

" Fig. 18. *Terebratula* (undet.) Lower Fort Garry, Red River of the North.

" Fig. 19. *Pleurorhynchus antiqua.* This small and delicately-formed Pleurorhynchus is, I believe, the first of the genus that has been discovered in this country in rocks of Lower Silurian date.

" Fig. 20. *Orthis* (undet.), allied to *O. occidentalis*, in the shell-beds, F. 3, A, three miles above Savannah, Wisconsin.

" Fig. 21. *Leptæna* (N. S.?), allied to *deflecta*, in the shell-bed, F. 3, A, three miles above Savannah.

" Fig. 22. *Cytherina* (undet.), from the outcrops of magnesian limestone, equivalent to F. 3, A, at the Great South Bend of Red River of the North.

" Fig. 23. *Orthis disparilis.* Agency, Turkey River, Iowa; shell-beds at the base of the Upper Magnesian Limestone.

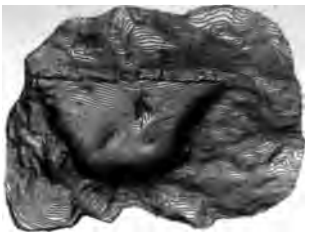


TABLE III.

SPIRIFERS, ORTHIS, AND STROPHODONTA, FROM THE SHELL-BEDS OF THE IOWA AND CEDAR RIVERS, BELONGING TO THE DEVONIAN PERIOD.

All the Spirifers but figs. 5 and 7, from this formation, seem to be destitute of ribs on the mesial fold or bourrelet.

Tab. III., Fig. 1. *Spirifer Iowensis* (N. S.) Iowa River.

" Fig. 2. Cast of *Spirifer curuteines* (N. S.), Pine Creek, Iowa, showing the broad area of the ventral valve.
a. Front view of same, showing the deep broad sinus of the ventral valve.

" Fig. 3. *Spirifer pennatus* (N. S.). Iowa River.

" Fig. 4. *Spirifer ligus* (N. S.), New Buffalo, Iowa.

" Fig. 5. *Spirifer Cedarensis* (N. S.), two and a half miles below Rockingham.

" Fig. 6. *Spirifer curuteines*, Pine Creek, Iowa.

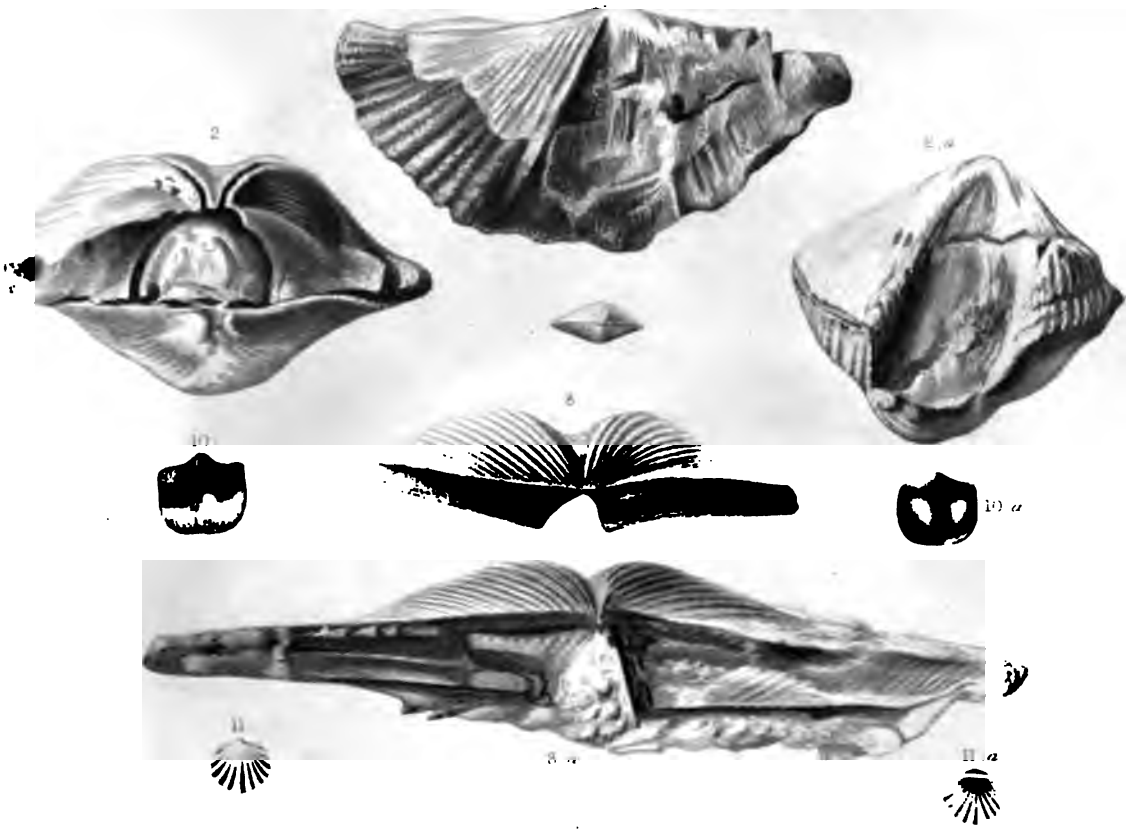
" Fig. 7. *Spirifer* (N. S.?), allied to S. undiferous, Davenport, Iowa.

" Fig. 8. *Spirifer pennatus?* a young individual, Iowa River.

" Fig. 9. *Spirifer* (undet.), in limestones of the age of the Hamilton Group of New York, near Rockingham, Iowa.
This small Spirifer is allied to *Spirifer muralis* of Verneuil, but is smaller; cardinal angles not so much produced; cardinal border less wide and vertical; the ribs fewer, only about ten, and finely imbricated by layers of increase.

" Fig. 10. *Orthis lentiformis?* Near New Buffalo, Iowa.
In size and general contour this Orthis resembles *O. lentiformis* of the Corniferous Limestone of New York, fig. 4, No. 28, of Hall's New York Report. The striæ are so fine as hardly to be discerned without a magnifier; and the sinus of the dorsal valve is almost obsolete.

" Fig. 11. *Strophodonta? costata*, (N. S.) Davenport, Iowa.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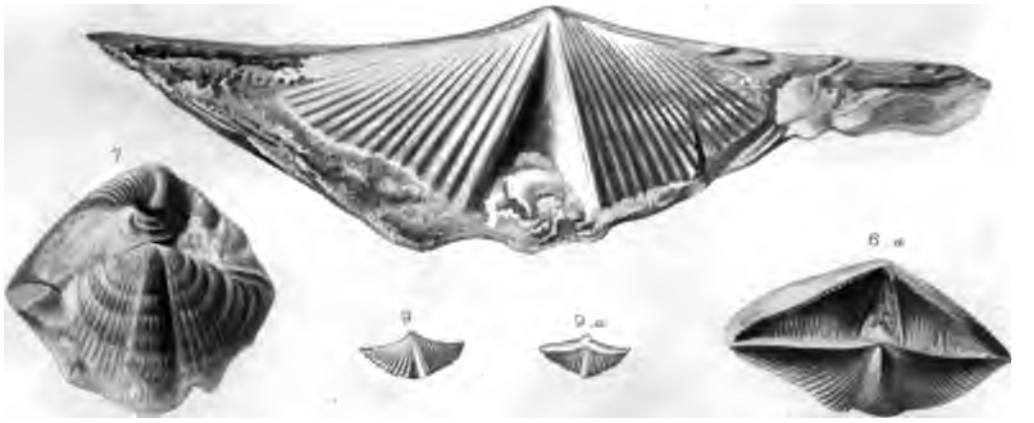
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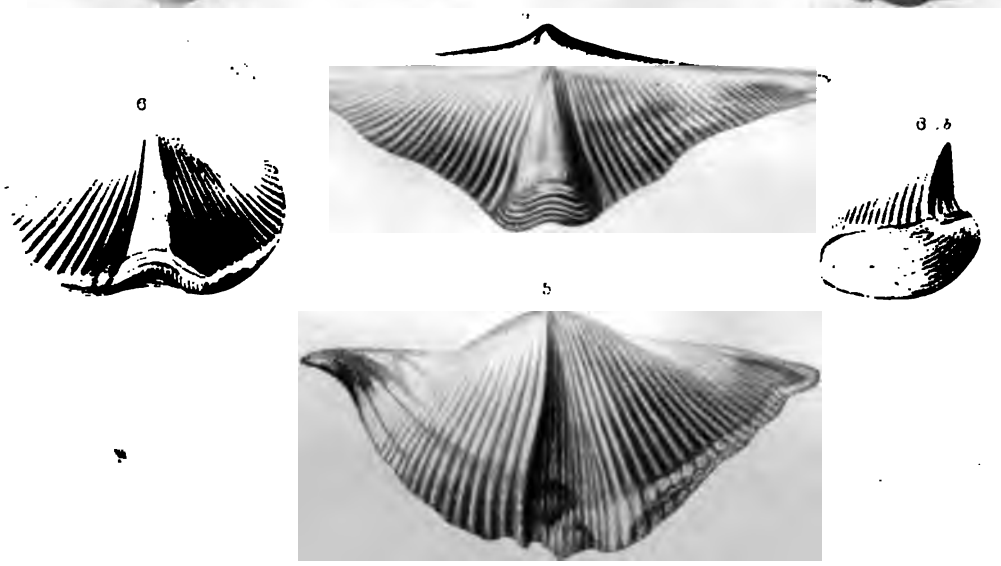
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TABLE III.

A.

FOSSIL SHELLS AND CORALS FROM THE CARBONIFEROUS LIMESTONE, AND FROM THE ADJACENT LIMESTONES OF IOWA OF THE AGE OF THE HAMILTON GROUP OF NEW YORK.

Tab. III. A, Fig. 1. *Atrypa* (N. S.?), Iowa City. This will probably be found to be a new species, since the corresponding beds of limestone of Devonian date in this country have not yet yielded any ribbed Atrypa.

" Fig. 2. *Spirifer lignus*, var. (*N. S.*) Near Rockingham, Iowa, in limestones of the age of the Hamilton Group of New York.

This Spirifer is considerably deeper than Fig. 4, Tab. III., and the ribs apparently fewer in number, otherwise it has a strong resemblance to that species. The specimens hitherto obtained are hardly perfect enough to determine with certainty the identity.

" Fig. 3. *Avicula* (sp. undetermined), from oolitic beds of the Carboniferous Limestone, three miles below Augusta, Skunk River, Iowa.

" Fig. 4. *Atrypa comis* (N. S.) This smooth species of Atrypa is from the limestone of the Upper Rapids of the Mississippi, of Devonian date.

" Fig. 5. *Strophodonta? costata* (N. S.) This minute Strophodonta, ribbed like a modern pecten, is from the Davenport Limestone, of Devonian date.

" Fig. 6. Pygidium of *Phacops crassimarginata*, three miles below Rockingham, in limestones of Devonian date, associated with *Fenestella*, figs. 16 and 21.

" Fig. 7. *Chonetes Iowensis* (N. S.?) in the limestones of Iowa City, of Devonian date.

" Fig. 8. *Spirifer attenuatus?* var. of *S. striatus?* in the limestones of the Keokuk Rapids of the Mississippi, of carboniferous date.

This species of Spirifer, which occurs in great abundance in member *f* of the Lower Series of Carboniferous Limestone on the Keokuk Rapids of the Mississippi, but rather of a smaller size than the figure here given, belongs, so far as I am able to discover, to the above variety of *S. striatus*, as given by Verneuil and De Koninck, in their works on Russia and Belgium.

The fossil which I have figured differs, however, from the large *S. striatus* in the simplicity of the ribs, their fewer number and greater size, and in these being seldom dichotomous. There are usually but three ribs in the sinus, the middle one being the largest, and the same number on the bourrelet; and twelve to thirteen additional ribs on either side of the sinus.

The same beds contain another Spirifer, closely allied to this, and about the same size, which has but a single rib in the middle of the sinus.

Another Spirifer, of rather larger dimensions, is associated in the same beds with the two preceding, which is entirely destitute of ribs on either the sinus or bourrelet, and which approaches in form to the Devonian Spirifer, which occurs in the limestone of Cedar and Iowa Rivers, and which I have named *S. eurateines*, except that it has not so wide a cardinal area. I am disposed to consider the first two varieties to be young forms of *S. striatus*, which in its adult and characteristic form is abundant at the same locality.

" Fig. 9. *Strophodonta parva* (N. S.), in limestones of the age of the Hamilton Group of New York.

" Fig. 10. *Orthis* (N. S.), allied to *lentiformis*, from limestones of the age of the Hamilton Group of New York, near New Buffalo.

" Fig. 11. *Pentamerus* (N. S.?), from the limestones near Davenport, Iowa.

" Fig. 12. Slab of Productal Carboniferous Limestone, near Wayne City, Missouri River.

" Fig. 13. *Terebratula serpentina* (?), Skunk River, Iowa. Carboniferous.

" Fig. 14. *Strophodonta dimosa* (?), from limestones of the age of the Hamilton Group of New York, near New Buffalo, Iowa.

" Fig. 15. *Terebratula* (sp. undet.), from limestones of the age of the Hamilton Group of New York.

" Fig. 16. *Fenestella* (sp. undet.), from limestones of the age of the Hamilton Group of New York, near Rockingham, Iowa.

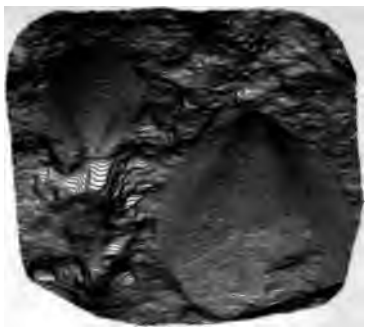
" Fig. 17. *Chonetes* (sp. undet.), a few miles north of Iowa City.

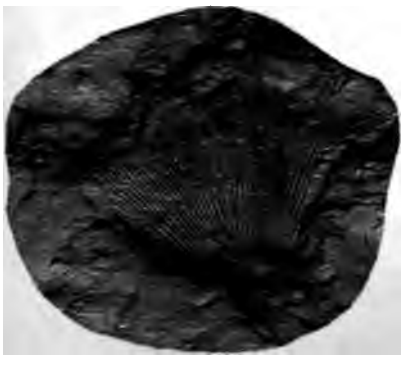
" Fig. 18. Cast of a *Sanguinolaria*, from the base of the Carboniferous Limestones, near Burlington.

" Fig. 19. *Gorgonia*, allied to *repisteria*, in limestone of the age of the Hamilton Group, near Rockingham.

" Fig. 20. Part of tooth of *Psammodus*, from the Lower Series of Carboniferous Limestone, on the Keokuk Rapids of the Mississippi, associated with *Productus punctatus* and *Spirifer cuspidatus*.

" Fig. 21. *Fenestella Milleri* (?), in limestones of the age of the Hamilton Group of New York.





Models ruled on steel from the original specimens

J M Butler

TABLE IV.

FOSSIL CORALS, FROM THE CARBONIFEROUS ROCKS OF IOWA.

Tab. IV., Fig. 1. *Retepora Archimedes*, from beds *f*,* near the top of the Lower Series of Carboniferous Limestones, Keokuk Rapids of the Mississippi.

" " *a*. Magnified view of a portion of the reticulated screw-like expansions of the coral, showing the form and distribution of the fenestrules, interstices, and dissepiments.

This reticulated fossil coralline has a wide geographical distribution in rocks of this age in the Western States of North America. It has been known to Western geologists for many years under the name of *Archimedes*. Lesueur prepared drawings of this fossil before he left this country finally for France, doubtless with the intention of publishing a description of it; but never did so, to my knowledge. I gave a figure of it, in 1842, in an article which I prepared for Silliman's Journal, "Regarding Human Foot-marks"† in the Carboniferous Limestone of the Mississippi, and stated that it seemed to be a species of *Retepora* coiled in the shape of a screw. If the reticulated species of corals which have usually been referred to this genus really are distinct from *Gorgonia*, then it belongs doubtless to the genus *Retepora*. De Koninck, in his work descriptive of the carboniferous fossils of Belgium, says it is exceedingly difficult to distinguish fossil *Gorgonia* from *Retepora*, as the distinction lies merely in the absence or presence of a *cortical investment*, which in fossils is seldom preserved; and he refers all his carboniferous fossils, possessing a similar structure to this coral, to *Gorgonia*, because he says that Goldfuss has undoubtedly detected a cortical investment in *Gorgonia repisteria*, and infers that all its congeners, of an analogous structure, have a similar organization. If this be so, it is possible that the *Archimedes* may be a screw-shaped *Gorgonia*.

" Fig. 2. *Cyathophyllum* (*vermiculare?*) Goldfuss. It is with some hesitation that I refer this coral to the above species, since some of its characters are certainly distinct from that species, as given by Goldfuss. Neither at the knee-like flexions, nor elsewhere on the external surface, are the margins of the cells visible, but only annular swellings continuous with the general surface of the coral. The terminating cell is shallow, oblique, with about forty-five lamellæ radiating *straight* from near the axis to the circumference, where faint, short, intermediate lamellæ can sometimes be observed. Coral bent at intervals, and at the same time slightly twisted on its axis; almost cylindrical, or very slightly conical.

Dimensions, about five inches long, and half an inch in diameter.

It occurs in the Carboniferous Limestones, near the mouth of Keg Creek, associated with *Chonetes variolata*.

If it be new, as is very probable, I propose for it the name of *C. torquium*.

" Fig. 3, *a*, *b*. *Cyathophyllum flexuosum* (?), from near the mouth of Keg Creek.

" Fig. 4. *Cyathophyllum* (*fungites?*) (Flem.), from the Keokuk Rapids of the Mississippi.

" Fig. 5. *Lithostrotion basaltiforme* (*Stylina* of Lesueur).

" " *a*. Dissected cell-tube, showing the external walls, the irregularly arched cellular structure between them and the core; the internal structure of the latter with its arched partitions and styloid axis. From bed *d'* of the Upper Series of Carboniferous Limestone, Sweet Home, on the Des Moines River. This honeycomb-like coral is remarkably characteristic of member *d'* of the Upper Series of Carboniferous Limestones of Iowa, and indeed prevails in the same geological position all over the Western States. As early as 1832, Lesueur figured this fossil under the name of *Stylina*, by which name it was long known to Western geologists. Its internal structure seems to correspond very nearly with the description given by Keyserling, p. 152, of the *Lithostrotion*, as it occurs in the Southern Urals. The coral is made up of groups of nearly parallel polygonal prisms, mostly five-sided, but some four- and six-sided. Each prism is composed of simple external walls (5, *a*), a thick core, and an axis. Between the external walls and core are funnel-shaped, plicated lamellæ, which blend into both, and give the outer surface of the core a ribbed appearance. The inner part of this core is divided by transverse septæ, arched slightly upwards, and connected with each other by a short, thin, pointed, concentric axis, which usually projects from the centre of the terminating cell, in the form of a prominent styloid process, which suggested to Lesueur the name of *Stylina*. The increase of the coral seems to take place partly by the springing up of young, small, prismatic cells between the larger old prisms, and partly by the addition of new cells on the top of the old ones.

" Fig. 6. Another species, or perhaps only a variety of this coral, occurs in the same part of the Carboniferous Limestone of Iowa and Missouri, especially when the beds assume a dolomitic composition. The internal structure of this Lithostrotion is essentially the same; it occurs, however, in hemispherical masses, of which the tubes forming the cells are almost conical, and tapering towards their origin, where they almost lose their prismatic form; from their origin the groups of tubes radiate in curves from the centre towards the circumference of the hemispherical mass.

* See table on p. 92

† Silliman's Journal Vol. xlii. No. 1, July, 1842, p. 14.

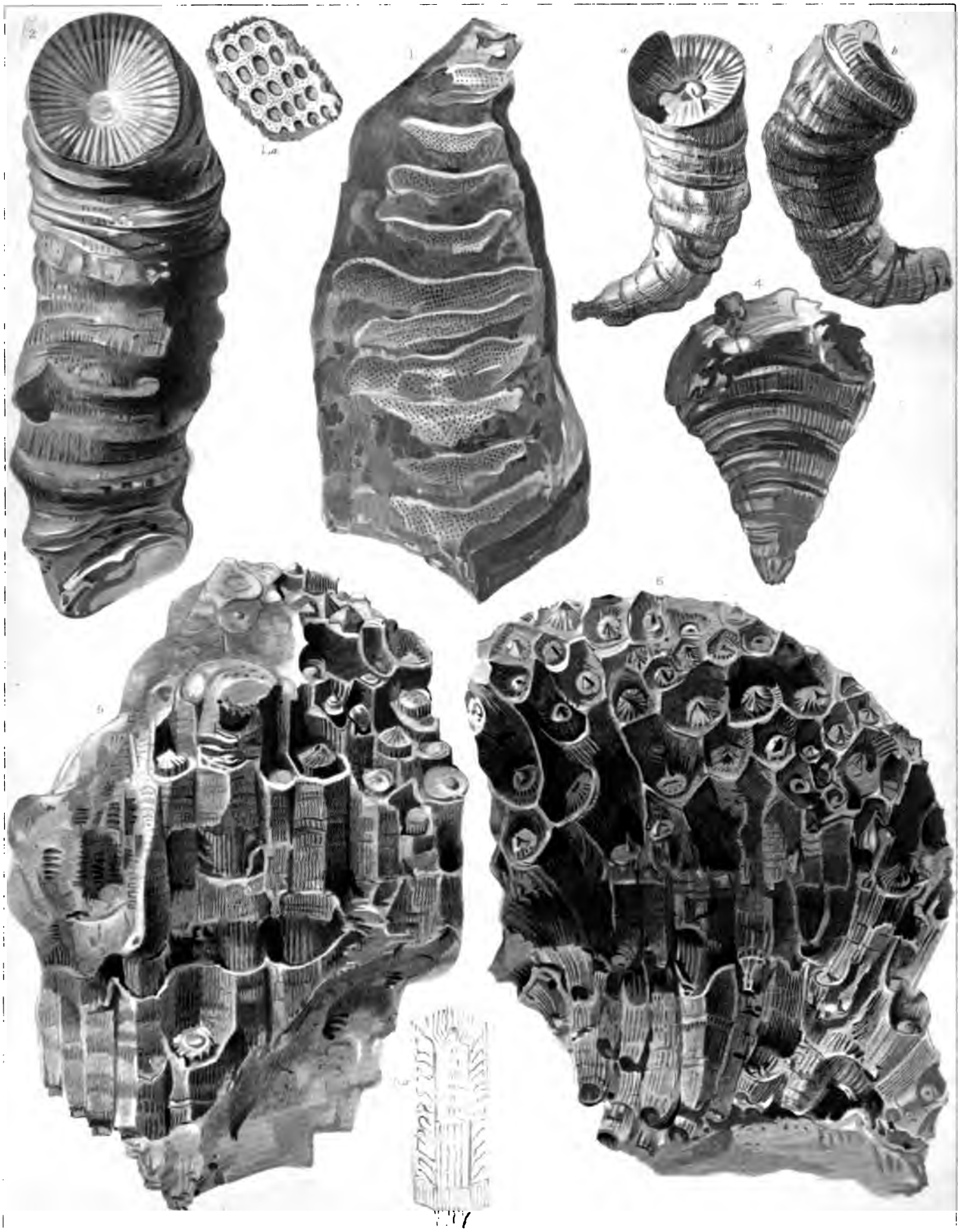

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TABLE V.

FOSSIL-SHELLS FROM THE CARBONIFEROUS LIMESTONES OF IOWA AND NEBRASKA.

Tab. V., Fig. 1. *Productus cora* (large variety). Missouri River, below the mouth of Little Platte River.

" Fig. 2. *Productus Flemingii* (Low.); synonyms *lobatus* (Ver.); *longispinus* (Kon.) Missouri River, near the mouth of Keg Creek.

" Fig. 3. *Productus Nebrascensis.* Missouri River, near Council Bluffs.

" Fig. 4. *Spirifer fasciger?* Missouri River, near the mouth of Keg Creek, and Plattsburg, Missouri.

This species approaches in many of its characters to *S. fasciger* of Keyserling. It appears to differ, however, in some particulars, perhaps sufficiently to constitute a distinct species. Like the *fasciger*, it has a deep sinus, and corresponding permanent and rather sharp bourrelet. Like it, too, the surface of the shell, on either side of the bourrelet and sinus, both on dorsal and ventral valve, is marked by folds or plications, but these are not only more numerous (4 to 6) than in the description of the *fasciger*, but much more prominent than is indicated by the figures given of that species, Table 8, figs. 3, and 3 *a* and *b*.* The folds are subdivided with small ribs of unequal size, generally from four to five on each fold. Both the sinus and bourrelet are provided with from nine to ten ribs of unequal size. The shell is therefore marked with fasciculæ or bunches of ribs collected into groups, each group containing from three to six ribs.

There is a smaller plicated Spirifer abundant in the calcareous rocks of the western and southern margins of the Iowa and Missouri coal-field, which is probably the same as this species, described by Hall under the name of *S. triplicata*, in Stansbury's Expedition to the Great Salt Lake, which may be a smaller variety or young individual of this fossil.

" Fig. 5. *Spirifer attenuatus*, in member *e* of the Lower Series of Carboniferous Limestones, on Skunk River and elsewhere.

" Fig. 6. *Spirifer inequicostatus?* Skunk River? Iowa.

" Fig. 7. *Ancella crassicollis?* Keokuk Rapids of the Mississippi River.

" Fig. 8. Cast of *Bellerophon hiulcus?* Keokuk Rapids of the Mississippi.

" Fig. 9. *Terebratula plano-sulcata.* Upper Missouri, near Council Bluffs.

" Fig. 10. *Gyroceras Burlingtonensis* (N. S.) From the oolitic bed, top of member *a*, of the Lower Series of Carboniferous Limestones, Burlington quarries.

" Fig. 11. *Orthis umbraculum?*

The description given by De Koninck of *Orthis umbraculum*, p. 222 of his work on the fossils of the Carboniferous rocks of Belgium, agrees with the characters of this species, obtained on the Missouri River, both near the mouth of Keg Creek, and under the marls and drift at the base of Council Bluffs, except in the number of ribs or striæ, which are much more numerous in the American fossil,—at least sixty at the beak, and more than double that number at the border, irregularly alternating coarse and fine; with three strongly-marked, concentric lines of increase, and one less distinct.

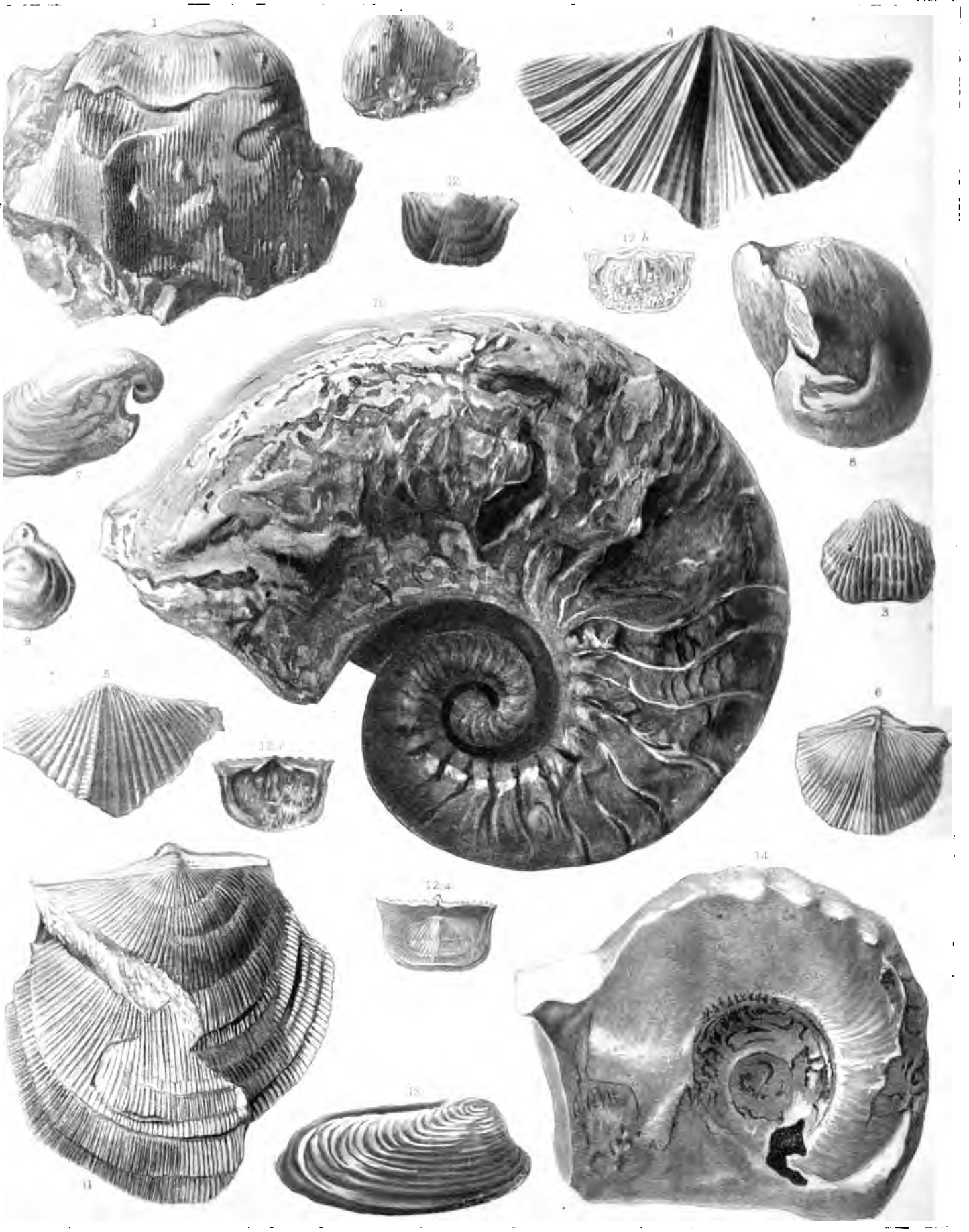
" Fig. 12. *Chonetes granulifera* (N. S.) Missouri River, near the mouth of Keg Creek.

" Fig. 13. *Allorisma regularis?*

I have not been able to discover any essential difference between this fossil, from near the base of the section at Wayne City, on the Missouri River, except that the shell is rather flatter, and the transverse folds are not so regular, some of the middle ones bifurcating, or becoming broad folds as they curve towards the posterior border; in this latter character it approaches to *A. sulcata*, but it is not gaping like that species, and is less gibbous and more elongated.

" Fig. 14. *Discites tuberculatus* (N. S.) Iowa Point, Missouri River.

* Wissenschaftliche Beobachtungen in das *Petschora Land*, p. 231.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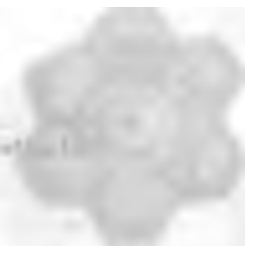
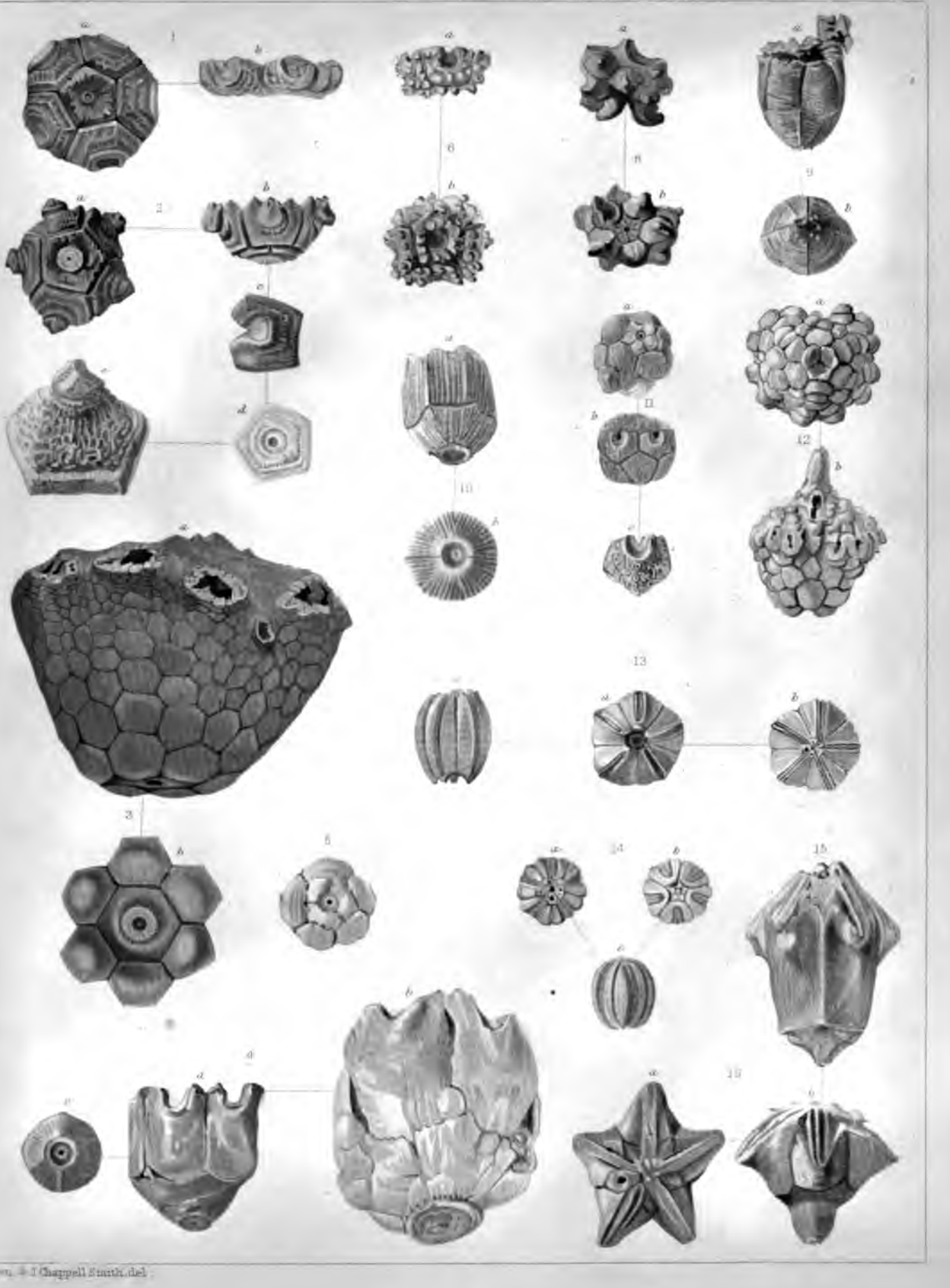


TABLE V.

A.

NEW SPECIES OF CRINOIDEA OF THE CARBO

Tab. V. A, Fig. 1. *Platycrinus discoideus* (N. S.) Burlington, Iowa.
" *a.* Basal view.
" *b.* Side view, showing the form of the articulating
" Fig. 2. *Platycrinus corrugatus* (N. S.) Burlington, Iowa.
" *a.* Basal view, with several joints of column attach
" *b.* Side view, showing the form of the first cuneifo
" *c.* Detached scapular plate.
" *d.* " basal plate.
" *e.* Scapular plate, enlarged, showing the corrugate
" Fig. 3. *Megistocrinus Evansii* (N. S.) Burlington, Iowa.
" *a.* Side view of the body, natural size.
" *b.* Basal aspect, showing the form of the basal and
" Fig. 4. *Platycrinus planus* (N. S.) Burlington, Iowa.
" *a.* View of the face of a specimen of medium size.
" *b.* View of a large specimen, from Burlington, Iow
" *c.* Detached basal plate.
" Fig. 5. *Platycrinus Burlingtonensis* (N. S.) Burlington, Iov
" Fig. 6. *Platycrinus Yandellii* (N. S.) Burlington, Iowa.
" *a.* Side view.
" *b.* Basal view.
" Fig. 8. *Cyathocrinus cornutus* (N. S.) Burlington, Iowa.
" *a.* Side view.
" *b.* Basal aspect.
" Fig. 9. *Dichocrinus ovatus* (N. S.) Burlington, Iowa.
" *a.* View of the face, exhibiting a fragment of an ar
" *b.* Basal plate, exhibiting its bi-partite character.
" Fig. 10. *Dichocrinus striatus* (N. S.) Burlington, Iowa.
" *a.* View of the side, showing the longitudinal stri
" *b.* Basal plate, exhibiting the division.
" Fig. 11. *Cyathocrinus Iowensis* (N. S.) Burlington, Iowa.
" *a.* Basal aspect.
" *b.* View of the side.
" *c.* Detached superior plate, showing the corrugated
" Fig. 12. *Actinocrinus unicornus* (N. S.) Burlington and Aug
" *a.* Basal view.
" *b.* Side view, exhibiting the position of the mouth.
" Fig. 13. *Pentremites Norwoodii* (N. S.) Burlington and Aug
" *a.* Basal view.
" *b.* View of the summit.
" *c.* View of the side.
" Fig. 14. *Pentremites melo* (N. S.) Burlington, Iowa.
" *a.* View of the summit, exhibiting the apertures.
" *b.* Basal view.
" *c.* Side view.
" Fig. 15. *Pentremites laternaformis* (N. S.) Mill Creek, Rand
" Fig. 16. *Pentremites stelliformis* (N. S.) Burlington, Iowa.
" *a.* View of the summit, exhibiting its star-like cont
" *b.* Side view.



J. O. Owen, & J. Chappell Smith, del.

J. W. Parker

TABLE V.

B.

NEW SPECIES OF CRINOIDEA OF THE CARBONIFEROUS LIMESTONE.

Tab. V. B, Fig. 1. *Platycrinus Americanus* (N. S.) Burlington, Iowa.
" *a*. View of the base of calyx.
" *b*. Side view.
" Fig. 2. *Poteriocrinus rhombiferus* (N. S.) Burlington, Iowa.
" *a*. Basal view.
" *b*. Side view, exhibiting the two accessory pieces.
" *c*. View of the side, showing the form of the superior plates.
" Fig. 3. *Poteriocrinus tumidus* (N. S.) Chester, Illinois.
" *a*. Basal view.
" *b*. View of the side.
" Fig. 4. *Poteriocrinus spinosus* (N. S.) Kaskaskia, Illinois.
" Fig. 5. *Poteriocrinus occidentalis* (N. S.) Chester, Illinois.
" *a*. Side view, showing the form of the accessory pieces, and a few of the joints of the arms remaining attached.
" *b*. Basal view.
" Fig. 6. *Agassizocrinus conicus* (N. S.) Chester, Illinois.
" Fig. 7. *Synbathocrinus dentatus* (N. S.) Burlington, Iowa.
" *a*. Basal view, showing the tripartite character of the basal plate.
" *b*. View of the side, exhibiting the dental elevations on the superior edges of the arm-bearing plates.

1.a

1.b

2.a

2.b

2.c

3.a

3.b

4

5.a

5.b

6

7.a

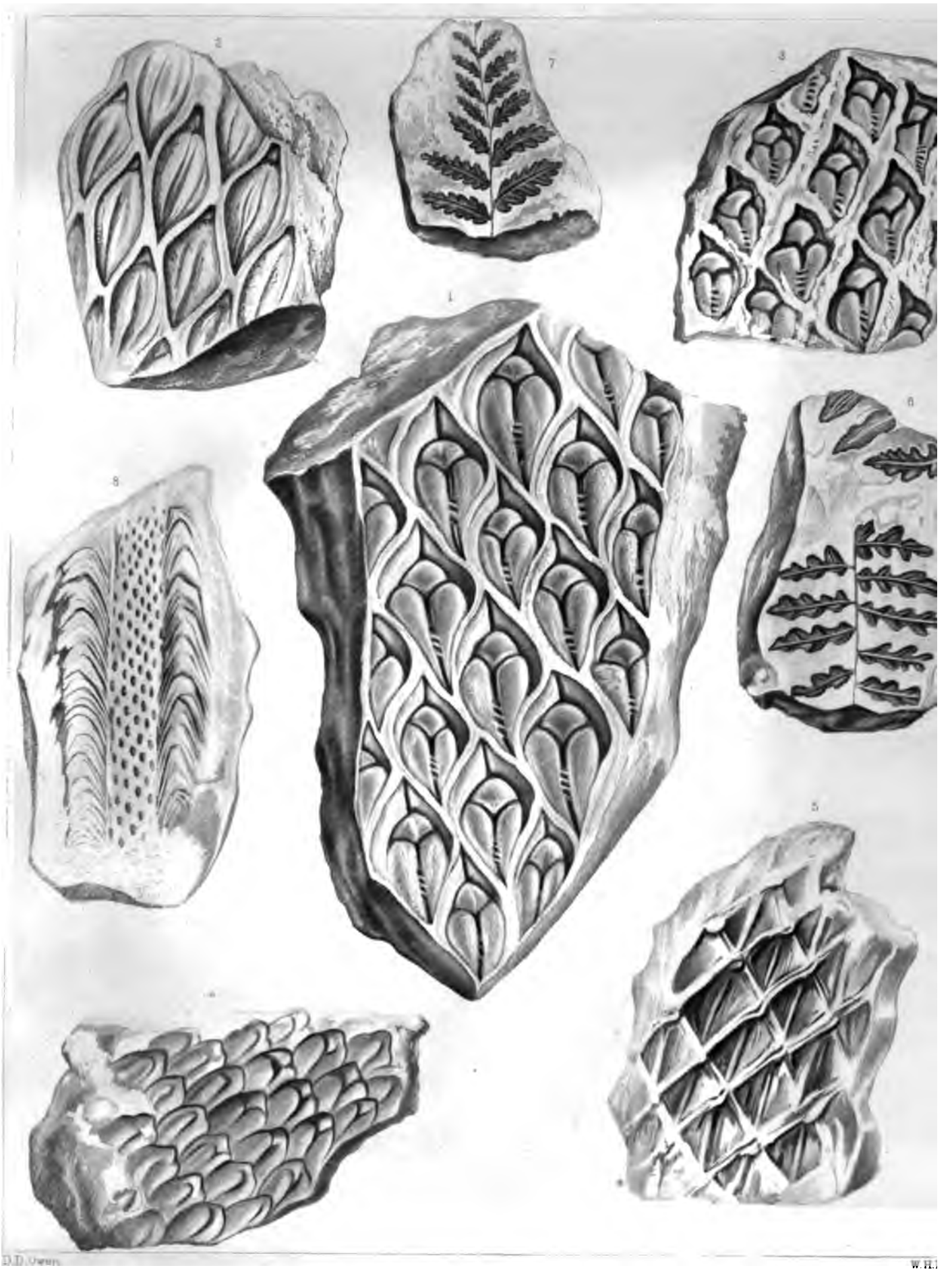
7.b

C. D. Oesen, del.

TABLE VI.

LEPIDODENDRONS AND FOSSIL FERNS, CHARACTERISTIC OF THE CARBONIFEROUS SANDSTONES, MUSCATINE QUARRIES, IOWA.

Tab. VI., Figs. 1, 3. *Lepidodendron aculeatum.* Sternberg.
" Fig. 2. " *obovatum.* Sternberg.
" Fig. 4. " *Sternbergii?*
" Fig. 5. " *dilatatum.* Lindley and Hutton.
" Fig. 6. *Pecopteris.* Species undetermined.
" Fig. 7. " (*Murrayana?*)
" Fig. 8. *Lepidostrobus.*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D.D. Owen.
W.H.

TABLE VII.

FOSSIL SHELLS CHARACTERISTIC OF THE CRETACEOUS FORMATION OF NEBRASKA.

Figures 2, 3, 4, and 5, Medal-ruled from the Original Specimens.

Tab. VII., Fig. 1. *Cucullæa Nebrascensis* (N. S.) Fox Hills, between the Cheyenne and Moreau Rivers, Nebraska.

" Fig. 2. *Ammonites Cheyennensis* (N. S.) Fox Hills, Nebraska.

" Fig. 3. *Inoceramus Sagensis* (N. S.) Sage Creek, a southern tributary of the Cheyenne, bordering on the confines of the Eocene Tertiary of Nebraska.

" Fig. 4. *Scaphites comprimus* (N. S.) Fox Hills, Nebraska.

" Fig. 5. *Ammonites* (?) ***Mandanensis***, Morton. Fox Hills, between the Cheyenne and Moreau Rivers, Nebraska.

On comparing this fossil with Dr. Morton's figure and description of *A. Mandanensis*, fig. 2, Pl. II., and p. 208 of vol. viii., part 1, of the Journ. Acad. Nat. Sci., I at first doubted whether it could be considered of that species, inasmuch as the tubercles of the internal margins, and even those of the external margins, were represented so much more distinct than they appeared on the Nebraska fossil. However, a comparison of the authentic specimens of A. Mandanensis in the Academy of Natural Sciences, convinced me that no specific distinction could be established.

If Scaphites can be shown to be a satisfactory genus,* then it seems probable that this fossil would rank with that group of concamerated shells. It is true that the boat-shaped form, from the deflection of the last half whorl, is obscure, but still it has a considerable general resemblance, and the compressed form of fig. 4, and has the same kind of ribbing on the last half whorl, on which the serrations of the sutures of chambers are not manifest.

" Fig. 6. *Baculites* (*compressus?*). Sage Creek, tributary of the Cheyenne, Nebraska.

" Fig. 7. *Baculites* (undet.). Sage Creek, Nebraska.

The surface of this fossil is waved, from broad and flatly-rounded ridges or eminences, which traverse it obliquely, and which, in consequence of their being most prominent near the margins of the longest diameter, form a shallow channel, or rather give a compressed form to the surface at right angles to the long diameter. The *Baculites ovatus* of Say has a similar waved surface, but differs in the transverse section presenting a more wedge-shaped form.

" Fig. 8. Mould of *Lucina?* Fox Hills, Nebraska.

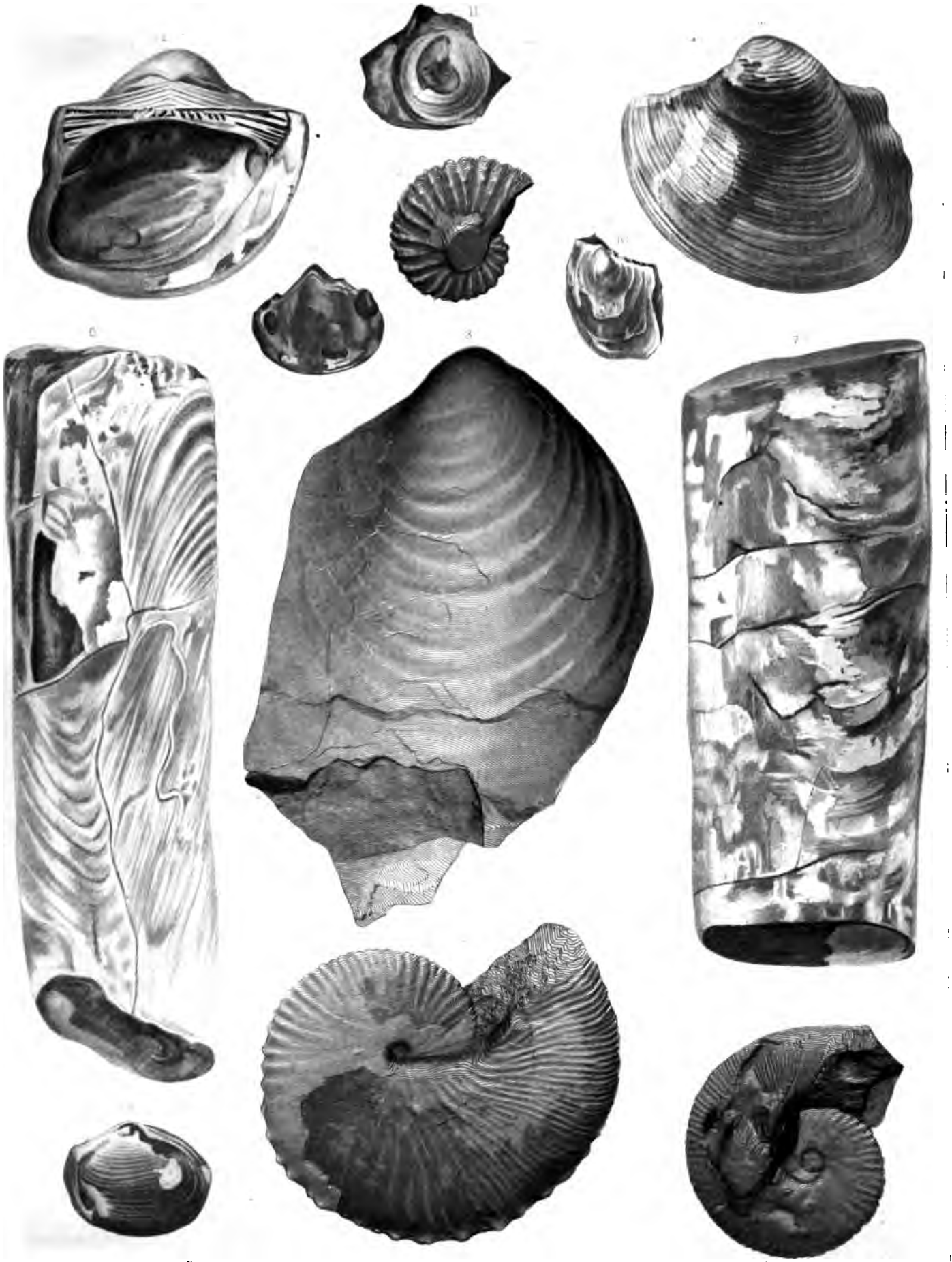
" Fig. 9. Mould of *Pectunculus*. Fox Hills, Nebraska.

" Fig. 10. *Avicula* (undet.) Fox Hills, Nebraska.

In form this Avicula approaches to *A. cærulescens* of Nelson, as figured by Goldfuss, from the cretaceous formation of Westphalia. Its breadth, however, is greater in proportion to the length of the shell, which is rhombic in form, and less oblique than Goldfuss's figure, and is not provided, near the middle of the back, with minute tuberculated costæ.

" Fig. 11. *Orbicula* (undet.) Fox Hills, Nebraska.

* For remarks on this head, see Appendix to this Report, p. 579.



D.T. Owen

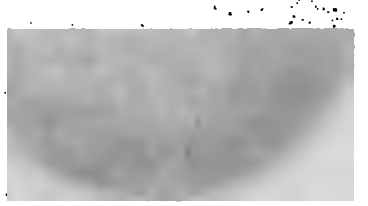


TABLE VIII.

AMMONITES AND SCAPHITES. FROM THE CRETACEOUS FORMATION OF NEBRASKA.

All, except Figures 6 and 3 *a*, medal-ruled on Steel from the Original Specimens.

Tab. VIII., Fig. 1. *Ammonites Nicolletti*, Morton. Fox Hills, between the Cheyenne and Moreau Rivers.

This Ammonite agrees with Morton's description of the above species, published in the Journal of the Academy of Natural Sciences, vol. viii., p. 209, except that the costæ are closer together, are more numerous, and their bifurcations repeated sometimes twice before reaching the periphery; distinctions which are, however, not considered sufficient for the establishment of a new species.

There is another Ammonite from this locality, which probably may be referred to the same species, as it differs only in the tubercles at the margin of the periphery being more distinct.

" Fig. 2. *Ammonites Nebrascensis* (?). Fox Hills, Nebraska.

" Figs. 3, and 3, *a*. *Ammonites Nebrascensis*. Fox Hills, Nebraska.

" Fig. 4. *Scaphites nodosus* (N. S.) Sage Creek, southern tributary of the Cheyenne, Nebraska.

" Fig. 5. *Ammonites lenticularis* (N. S.) Fox Hills, Nebraska, associated with an *Avicula*.

" Fig. 6. *Ammonites opalus* (N. S.) Great Bend of the Missouri River, associated with *Inoceramus Cripsii*.

" Fig. 7. *Ammonites Moreauensis* (N. S.) Fox Hills of Nebraska, associated with *Avicula*, Tab. VII., fig. 10.

Fig.s 1.2.3.4.5.&7 Medal-ruled by H.White-smith,at J.M.Hordern's Establishment

TABLE VIII.

A.

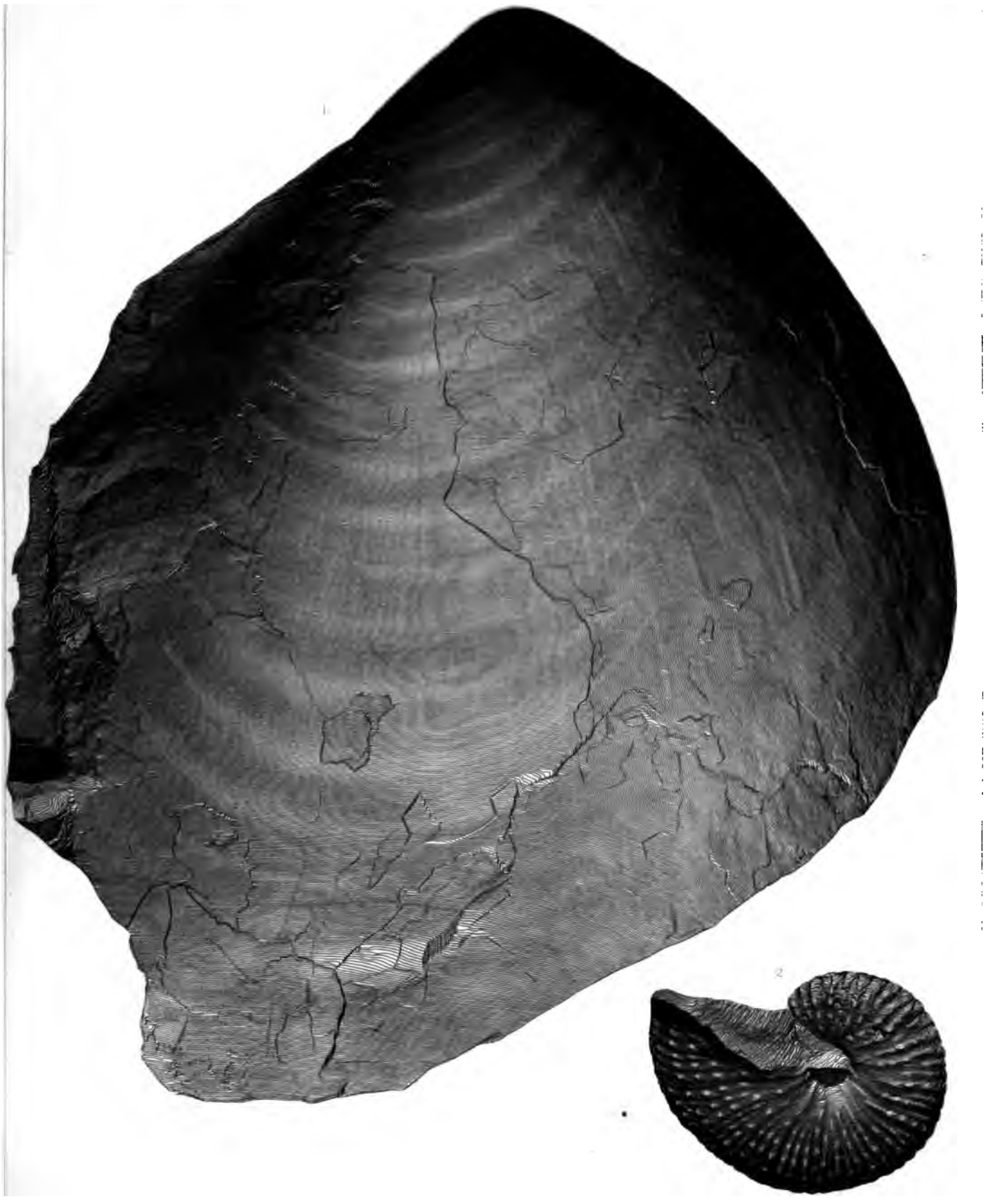
INOCERAMUS AND AMMONITE, FROM THE CRETACEOUS FORMATION OF NEBRASKA.

Medal-ruled on Steel, from the Original Specimens.

Tab. VIII. A, Fig. 1. *Inoceramus Nebrascensis* (N. S.) Sage Creek, Nebraska.

Before this fossil was engraved, it was thought to be altogether impracticable to execute a subject of so great convexity by the medal-ruling process, and the plate was undertaken as a mere experiment, which turned out, however, remarkably successful, and gives a wonderfully perfect representation; more perfect indeed, than could be obtained by any other method of engraving.

" Fig. 2. *Ammonites Nebrascensis.* Fox Hills, Nebraska.



Medal-ruled on steel from original specimens

by R Wimpenny & B P Newman at J M Butler's Establishment

TABLE IX.

REMAINS OF THE RHINOCEROS AND THE GIGANTIC PALEOTHERIUM OF THE EOCENE TERTIARY OF THE MAUVAISES TERRES OF NEBRASKA.

Tab. IX., Fig. 1. *Rhinoceros occidentalis.* Half the diameter of nature. Inferior view of the skull. Upon the left side all the molar teeth except the first are perfect, and the latter are entire on the opposite side.

" Fig. 2. Fragment of the left side of the lower jaw, the size of nature, of *Rhinoceros occidentalis.* It contains three molar teeth.

" Fig. 3. The last lower molar tooth of the left side of *Palæotherium* (*Titanotherium*) *Proutii*, the size of nature.

" *a.* Left side of the lower jaw of *Palæotherium* (*Titanotherium*) *Proutii*, reduced one diameter, containing the true molars, and portions of the preceding two premolars.

The Palæotheroid animals are more nearly allied to the Tapir than any other living animal, but approximate in some respects to the Rhinoceros.

D.D Owen.

W.H Dougal

TABLE X.

REMAINS OF ARCHÆOTHERIUM AND OREODON OF THE EOCENE TERTIARY OF NEBRASKA.

Engraved from Daguerreotypes of the Original Specimens.

Tab. X., Fig. 1. Inferior view of the upper jaw of *Archæotherium* (*Entelodon?*) *Mortoni*, one-half the diameter of nature. Upon the upper side of the figure may be observed the last two temporary molars, and the succeeding two permanent molars, and on the lower side the permanent premolar successors of the former teeth, and the following two true molars.

" Fig. 2. Side view of the head of *Archæotherium* (*Entelodon?*) *Mortoni*, reduced two diameters. In it are visible the posterior two temporary molars, and the first and second permanent true molars.

The lower jaw exhibits a portion of the unprotruded last permanent premolar, a fragment of the last temporary molar, and the first permanent true molar.

" Fig. 3. Portion of the left side of the lower jaw of *Archæotherium* (*Entelodon?*) *Mortoni*, reduced one diameter. It contains a portion of the last temporary molar, below which, in the figures, the unprotruded last permanent premolar is partially visible, and the permanent true molars.

Since writing the descriptions accompanying these plates, on the mammalian and chelonian remains of Nebraska, I have had an opportunity of inspecting Gervai's Palæontologie Françaises, in which is the sketch of an upper series of molar teeth of Entelodon, which so closely correspond to those of Archæotherium, that I think it very probable the latter may prove to belong to the same genus.

" Figs. 4–6. *Oreodon Culbertsonii*, reduced one diameter.

" Fig. 4. Inferior view of the skull, of a male individual, containing on both sides the molar series, almost perfect, the left canine tooth entire, and part of the right canine.

" Fig. 5. Side view of the skull, with the lower jaw, of a female individual. It contains all the molar teeth in both jaws, and the canines in the lower jaw.

" Fig. 6. Upper view of the skull of the same individual as the last.

The Archæotherium partook of the nature of the Hog and Peccary. Yet, by regarding its physiognomy, it will be observed that the animal must have had more decided carnivorous propensities than those pachyderms; indeed, in the greater size of the temporal fossæ and high sagittal crest, this fossil genus of Nebraska, approximated to the Cat tribe; and it is probable, when its canine teeth are discovered, that they will be found to have an analogy with the plantigrade or Bear tribe. Thus we have united in this singular extinct race characters witnessed now in two different orders.

The Oreodon was truly a ruminating Hog; its grinding teeth closely analogous to the Deer tribe, show that it chewed the cud like existing Ruminants, yet was provided with very peculiar canines, more like those of the Peccary than any other existing animal; while some portions of the cranium approach to the Camel and Lama. It possesses incisors in both jaws, differing in this respect from all existing Ruminants.

TABLE XI.

ADDITIONAL REMAINS OF ARCHÆOTHERIUM AND OREODON.

All the figures of the natural size.

Tab. XI., Fig. 1. Inferior view of the upper jaw of an adult individual of *Archæotherium* (*Entelodon?*) *Mortoni*. The left side of the specimen contains the first and second true molars, perfect, and the fangs of the last molar and of the preceding two premolars. The right side contains the greater part of the first true molar, the entire second, and the fangs of the third and those of the last premolar.

" Figs. 2, 3. *Oreodon gracilis*.

" Fig. 2. View of the right side of the skull of an adult individual.

" Fig. 3. View of the base of the same specimen. Upon the left side are exhibited the fourth premolar and the true molars, nearly entire.

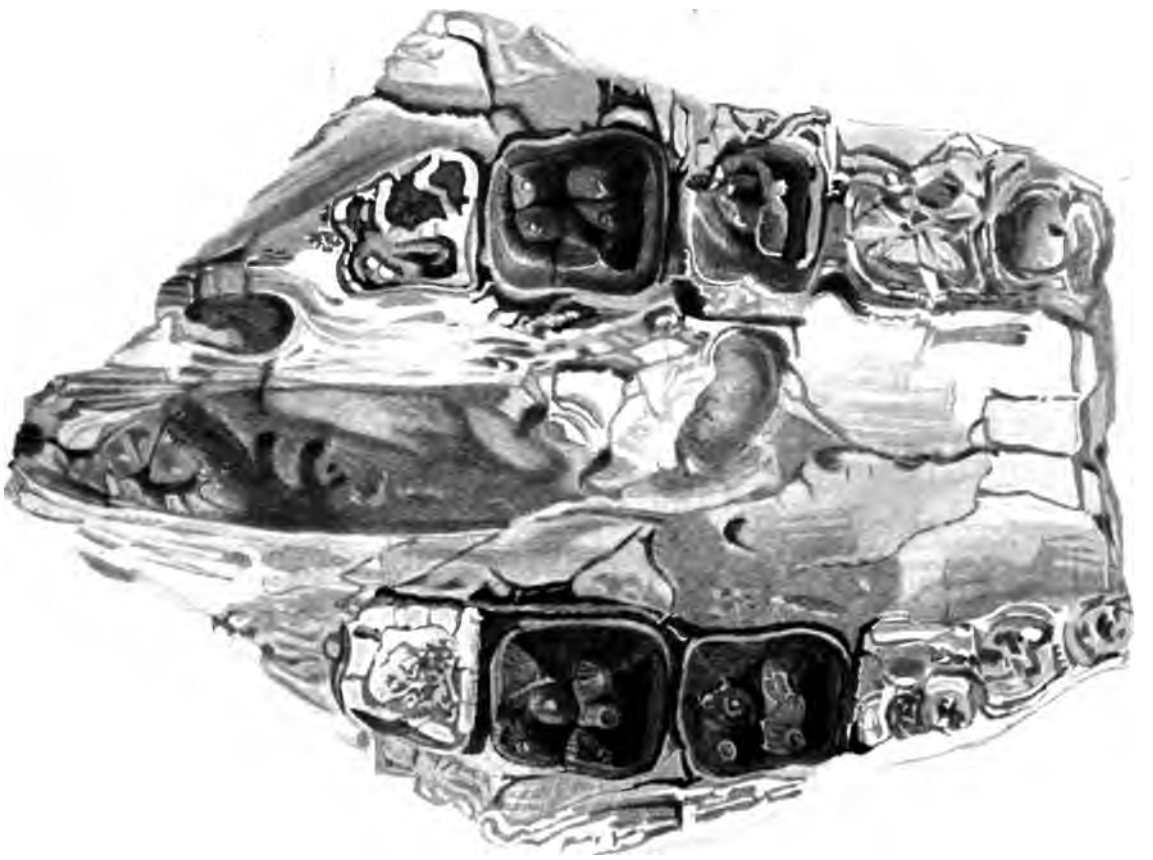


TABLE XII.

REMAINS OF A SPECIES OF LAND TURTLE, FROM THE EOCENE TERTIARY OF NEBRASKA.

Engraved from Daguerreotypes of the Original Specimen.

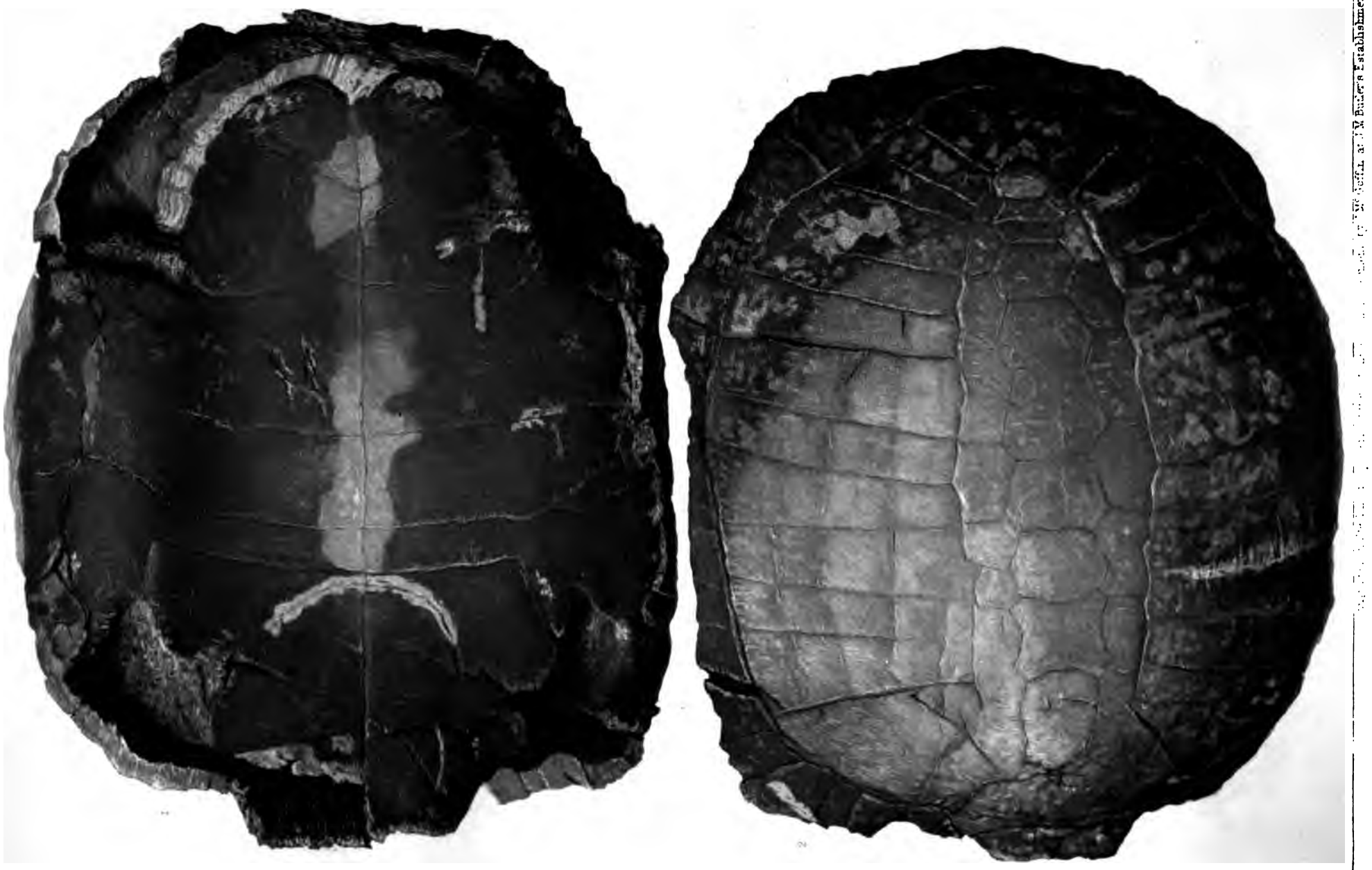
Tab. XII., *Testudo Culbertsonii*, two-fifths the diameter of nature.

" Fig. 1. Ventral view. Sternum.

" Fig. 2. Dorsal view. Carapace.

The anterior part of both figures is directed to the left of the engraving.

Though the fossil turtles of the Mauvaises Terres of Nebraska, have most analogy, in the details of the anatomy of the carapace, to the land tortoises, still their general form and appearance closely approximate to the aquatic turtles, and for this reason it is not improbable that they were partly aquatic in their habits.



Dean & Son, Ltd., at the Ballads Establishment

TABLE XII.

A.

TWO SPECIES OF LAND TURTLES, MACHAIRODUS, OR SABRE-TOOTHED TIGER, AND A SMALL SPECIES OF RHINOCEROS, FROM THE EOCENE TERTIARY OF NEBRASKA.

Engraved from Daguerreotypes of the Original Specimens.

Tab. XII. A, Figs. 1, 2. *Testudo Nebrascensis*, half the diameter of nature.

" Fig. 1. Dorsal view. Carapace.

" Fig. 2. Ventral view. Sternum.

" Figs. 3, 4. *Testudo Oweni*, three-tenths the diameter of nature.

" Fig. 3. Dorsal view. Carapace.

" Fig. 4. Ventral view. Sternum.

" Fig. 5. View of the left side of the skull and lower jaw of *Machairodus primævus*, two-fifths the diameter of nature. In the upper jaw are visible a portion of the canine, and the posterior three molars.

" Fig. 6. *Rhinoceros Nebrascensis*, two-fifths the diameter of nature. Inferior view of the upper jaw, containing the series of molars on both sides, nearly perfect.

TABLE XII.

B.

REMAINS OF A LAND TURTLE, RHINOCEROS, AND PALÆOTHERIUM, FROM THE EOCENE TERTIARY OF NEBRASKA.

Engraved from Daguerreotypes of the Original Specimens.

Tab. XII. B, Figs. 1, 2. *Testudo hemispherica*, one-third the diameter of nature.

" Fig. 1. Right dorso-lateral view.

" Fig. 2. Right ventro-lateral view.

The anterior part of both figures is directed to the right of the engraving.

" Figs. 3, 4. Fragments of the superior true molars, natural size.

I am at present very much inclined to consider these as belonging to a true species of Palæotherium, which from its very great size might be appropriately named Palæotherium maximum.

" Fig. 5. Fragment of the lower jaw of *Rhinoceros Nebrascensis*, the size of nature. It contains half of the first true molar, and both those succeeding, entire.

" Figs. 6–8. *Palæotherium* (*Titanotherium*) *Proutii*, the size of nature.

" Fig. 6. Fragment of the masticating surface of a superior true molar, exhibiting the inner conical lobe.

" Fig. 7. Crown of an inferior premolar.

" Fig. 8. Crown of an inferior canine.

Figs. 6–8, and figs. 3, 3 *a*, Tab. IX., I think belong to a different but closely allied genus to those represented in figs. 3 and 4 of this plate, which appear to be characteristic of a true Palæotherium.

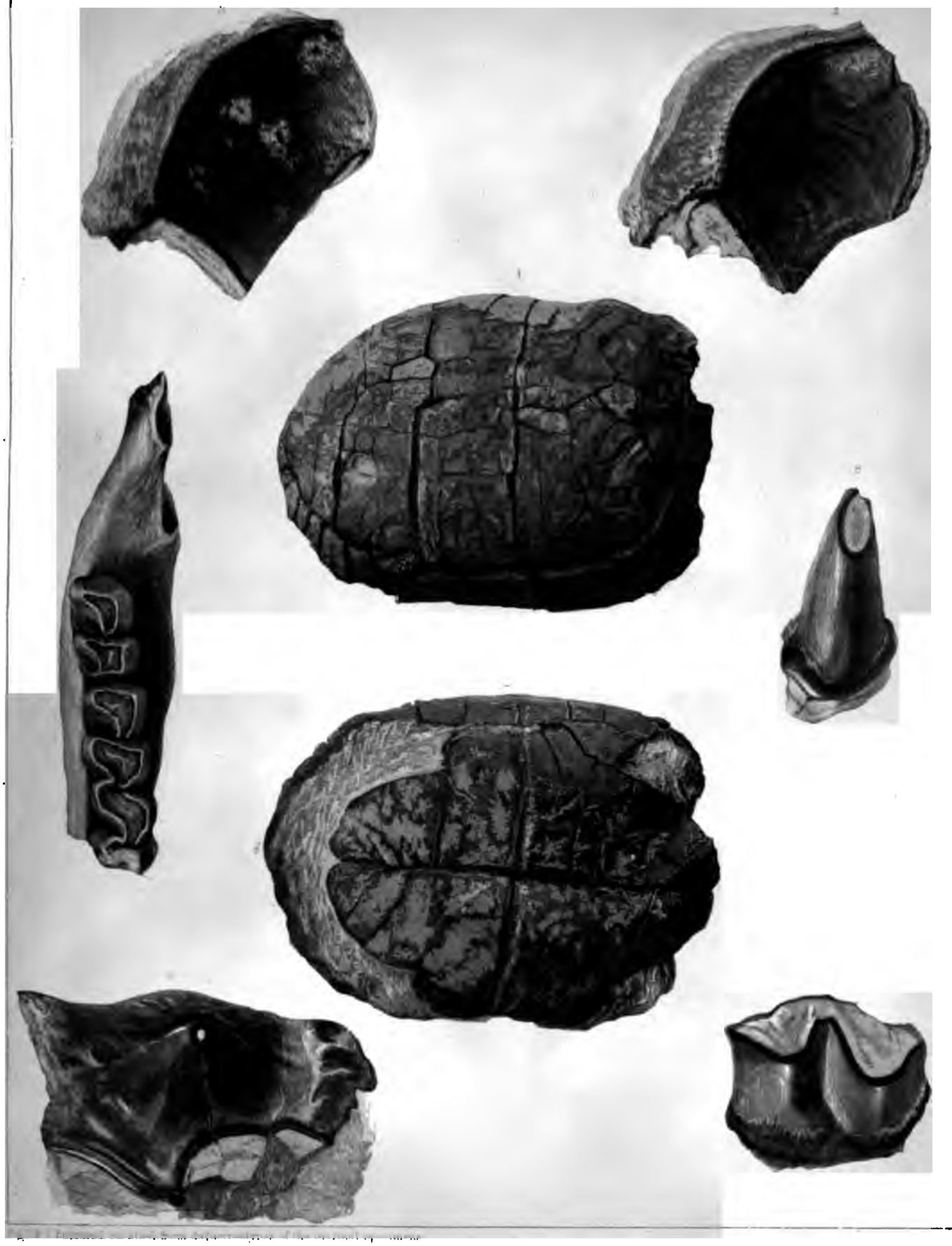


TABLE XIII.

REMAINS OF ARCHÆOTHERIUM AND OREODON, FROM THE EOCENE TERTIARY OF NEBRASKA.

The figures are all of the natural size.

Tab. XIII., Fig. 1. Distal extremity of an os humeri, viewed anteriorly.

" Fig. 2. The same specimen as Fig. 1, articulated with the radius and ulna, viewed internally.

None of the specimens of long bones in the collection, were found in immediate connexion with the fragments of crania, so that I am not able to ascertain with certainty to what species those represented belong. The humerus of Figs. 1 and 2 is about the same size as the corresponding portion of that of Cervus Virginianus; the radius is in a trifling degree larger, but the ulna is relatively much better developed. The relative size of the three bones agrees better with the Suiline animals than with Ruminants, and they may probably belong to Archæotherium Mortoni.

" Fig. 3. Fragment of the left side of the lower jaw of Oreodon Culbertsonii, viewed from above, and exhibiting the true molars and the posterior two premolars, with their crowns very much worn.

" Fig. 4. Fragment of the lower jaw of Oreodon Culbertsonii, exhibiting the triturating surfaces of the last two molars.

" Figs. 5, 6. Fragment of the right side of the lower jaw of Oreodon gracilis, containing the last two molars, and half of that in advance.

" Fig. 5. External view of the specimen.

" Fig. 6. View of the triturating surfaces of the teeth.

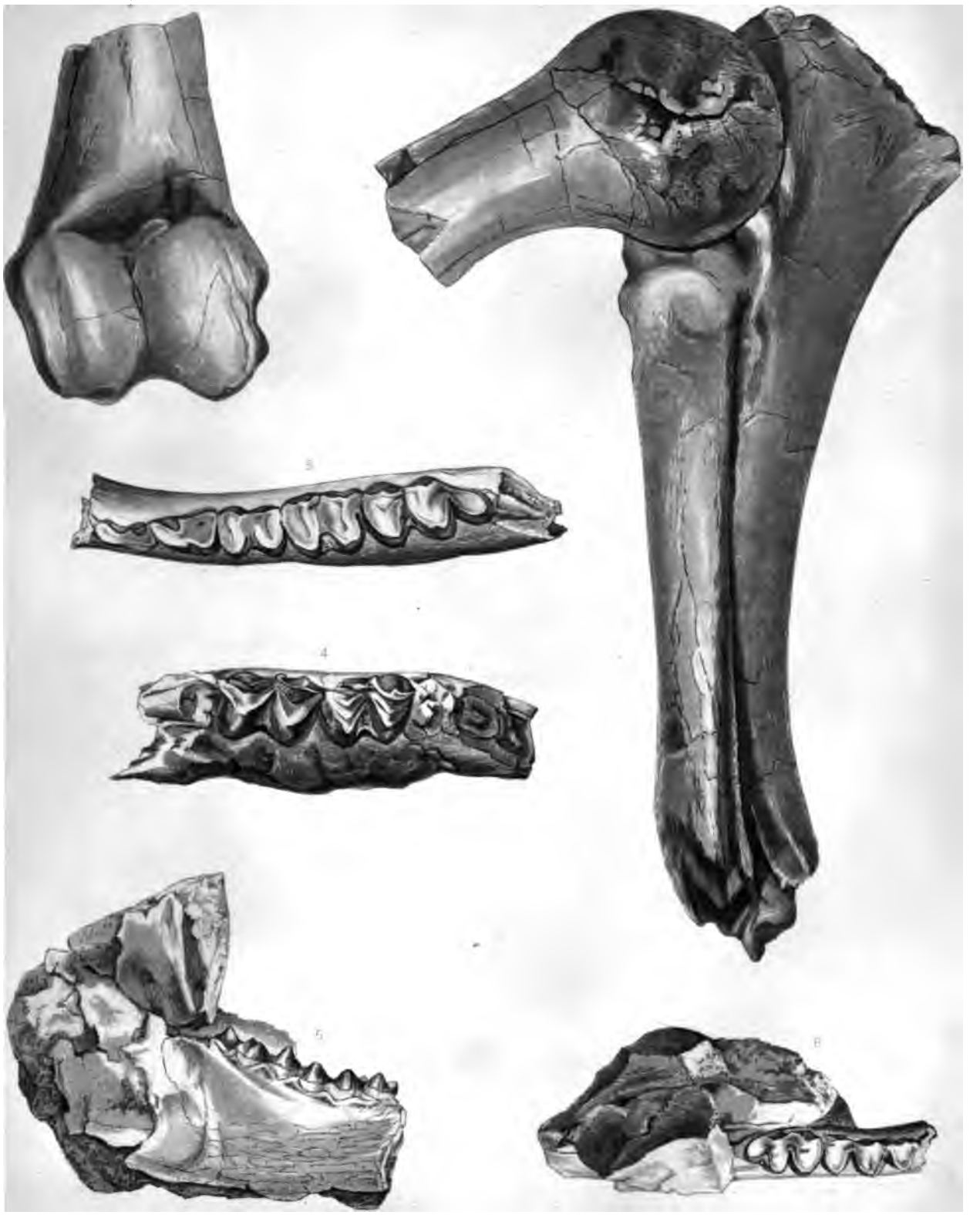


TABLE XIV.

REMAINS OF THE RHINOCEROS, FROM THE EOCENE TERTIARY OF NEBRASKA.

All the figures reduced one-third.

Tab. XIV., Fig. 1. Front view of the distal extremity of the os femoris, supposed to belong to Rhinoceros occidentalis.

" Fig. 2. Inner view of the same specimen.

" Fig. 3. The left tibia, probably also of the same species, though the specimen is relatively rather smaller than the former.

TABLE XV.

REMAINS OF EUCROTAPHUS AND OF THE RHINOCEROS, FROM THE EOCENE TERTIARY OF NEBRASKA.

All the figures are of the natural size.

Tab. XV., Fig. 1. View of the left side of a cranial fragment of Eucrotaphus auritus.

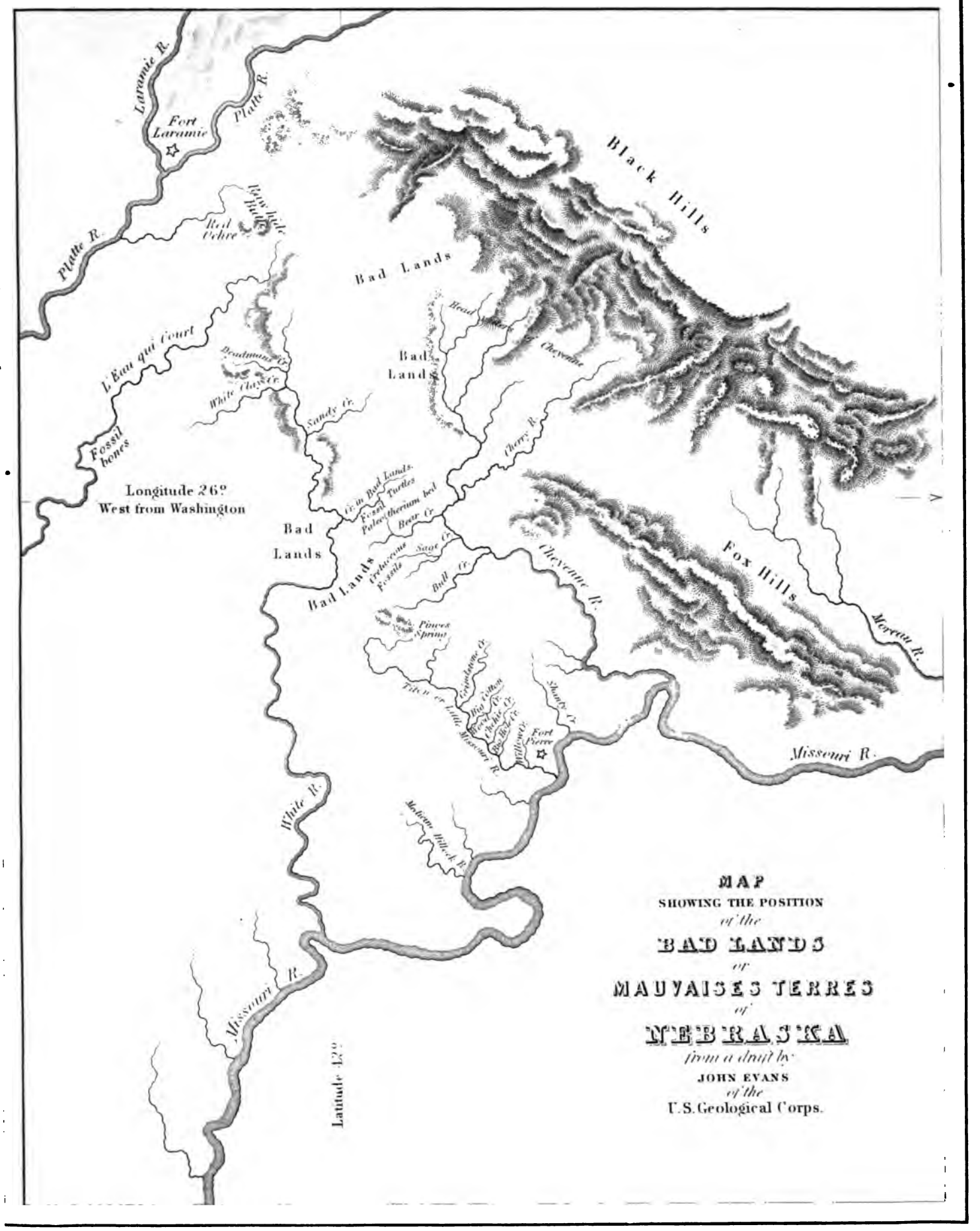
" Fig. 2. Upper view of the same fragment.

" Fig. 3. Portion of the right side of the lower jaw, containing the posterior three molars, of Rhinoceros Nebrascensis.

" Fig. 4. View of the proximal articulation of the tibia, supposed to be of Rhinoceros occidentalis.

The Eucrotaphus was a fossil ruminating Pachyderm, allied to the Oreodon, a ruminating Hog, whose analogies have been mentioned in the references to Table *X.*

Engraved from the original specimens by J.M Butler



MAP
SHOWING THE POSITION
of the
BAD LANDS
or
MAUVAISES TERRES
of
NEBRASKA
from a draft by
JOHN EVANS
of the
U.S. Geological Corps.

GEOLOGICAL MAP

of parts of

MINNESOTA AND WISCONSIN

designed to shew

Portions of the Rock Formations

now concealed by Drift

BY J. G. NORWOOD

LAKE SUPERIOR

Reference

Isle Royale

Pigeon R.

Grand Portage

Pt. Wauswaugon

Fond du Lac

Falls

Pokegama Falls

Mississippi R.

Rum R.

Snake R.

Knife R.

Vermilion L.

Sandy L.

Red Lake R.

Red River

Pembina

TABLE XV.

REMAINS OF EUCROTAPHUS AND OF THE RHINOCEROS, FROM THE EOCENE TERTIARY OF NEBRASKA.

All the figures are of the natural size.

Tab. XV., Fig. 1. View of the left side of a cranial fragment of Eucrotaphus auritus.
" Fig. 2. Upper view of the same fragment.
" Fig. 3. Portion of the right side of the lower jaw, containing the posterior three molars, of Rhinoceros Nebrascensis.
" Fig. 4. View of the proximal articulation of the tibia, supposed to be of Rhinoceros occidentalis.

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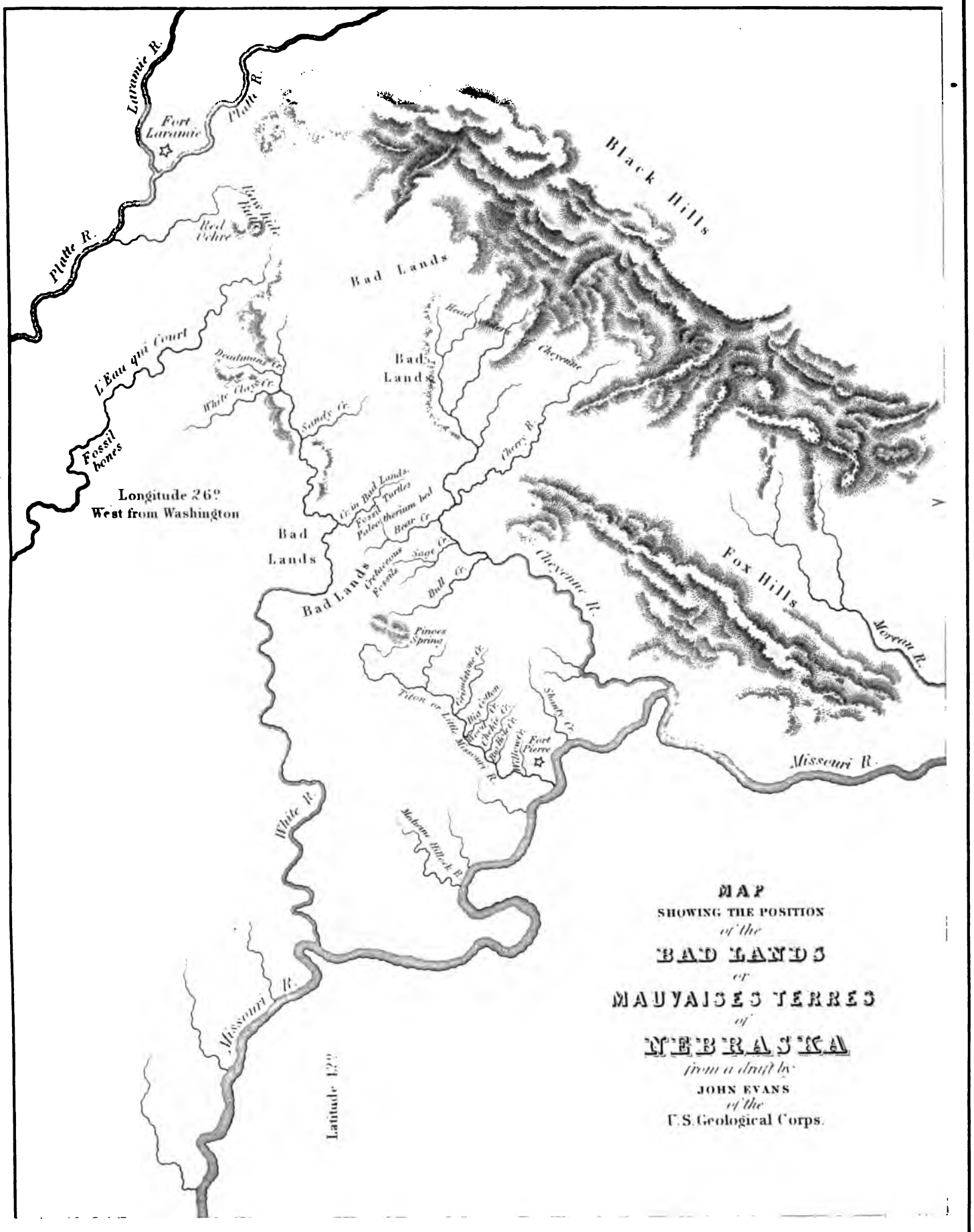
Engraved from the original specimens by J M Butler


Laramie R.
Platte R.
Fort Laramie
Platte R.
Black Hills
Bad Lands
Red Ochre
L'Eau qui Court
Deadmans Cr.
White Clay Cr.
Sandy Cr.
Fossil bones
Longitude 26°
West from Washington
Bad Lands
Head
Cheyenne
Cherry R.
Cr in Bad Lands.
Fossil Turtles
Poleotherium bed
Bear Cr.
Bad Lands
Cretaceous Fossils
Sage Cr.
Bull Cr.
Cheyenne R.
Fox Hills
Moreau R.
Pinees Spring
Tilton or Little Missouri R.
Shanty Cr.
Fort Pierre
Missouri R.
White R.
Medicine Hillock R.
Missouri R.
Latitude 42°
MAP
SHOWING THE POSITION
of the
BAD LANDS
or
MAUVAISES TERRES
of
NEBRASKA
from a draft by
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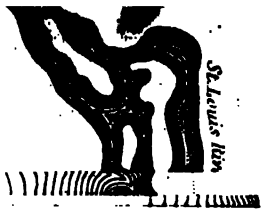
LAKE SUPERIOR

Reference

GEOLOGICAL MAP
of parts of
MINNESOTA AND WISCONSIN
designed to show
Portions of the Rock Formations
now examined by Dr W J G Swallow

Grand Portage Bay
Pigeon R.
Slates
Trap over Slates
Slates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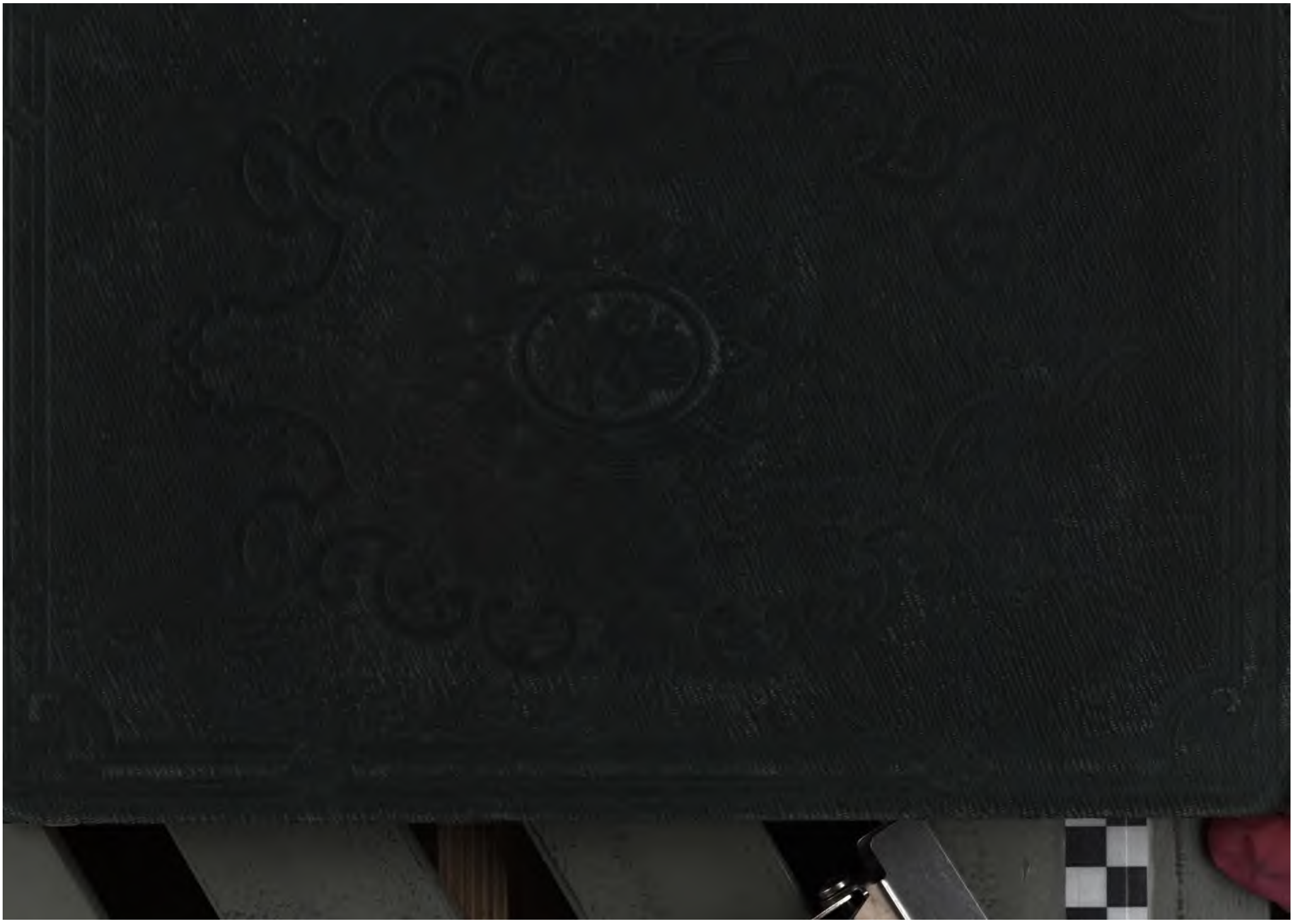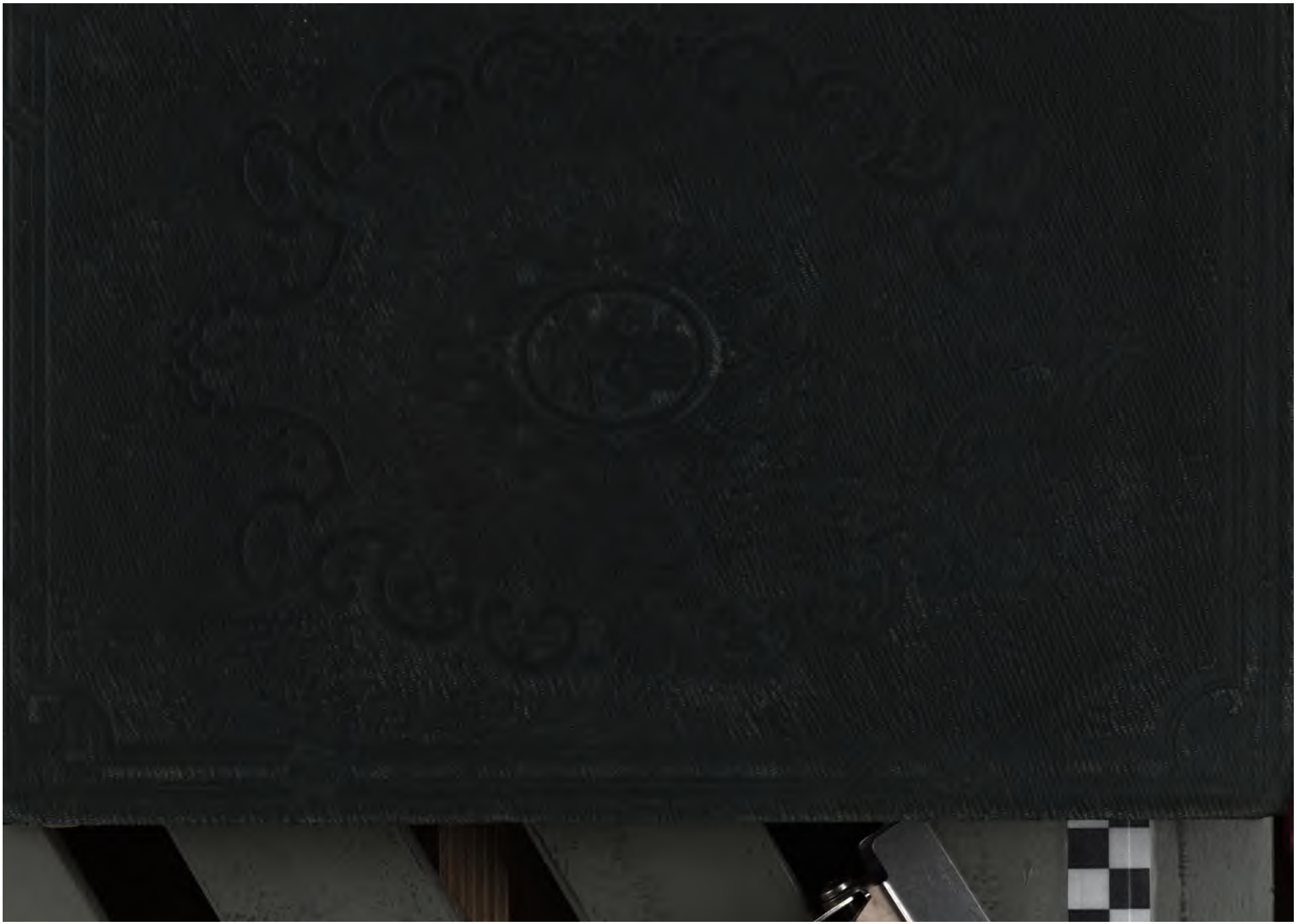
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